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IN THIS ISSUE

Faraday's Example	449
Steel Drum Manufacture	451
Landlord's Lighting. By A. V. Leighton, Associate I.E.E.	456
Turbine Blade-Tip Clearances	458
Engineering in Europe	459
Heat Generation in Electric Motors. By " Rotor "	461
Views on the News	465
Personal and Social	466
Parliamentary News	472
Dangerous Machinery. By F. E. Sugden	473
Overseas Electrical Trade	475
Recent Introductions	477
Brazilian Trade Facilitated	479
Commerce and Industry	481
All-Electric Kitchen Planning. By a Manufacturer's Representative	485
New Books	488
Electricity Supply	489
Manufacturing Progress, 1952	491
Financial Section	494
Next Week's Events	498
New Patents	499
Contract Information	501
Classified Advertisements	137
Regional Guide to Electrical Contractors	151
Index to Advertisers	154

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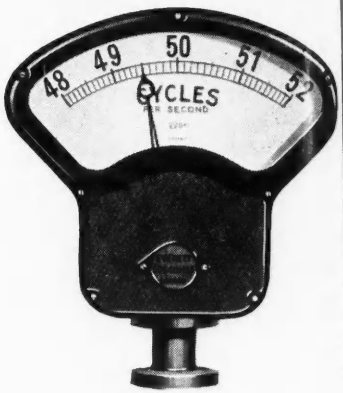

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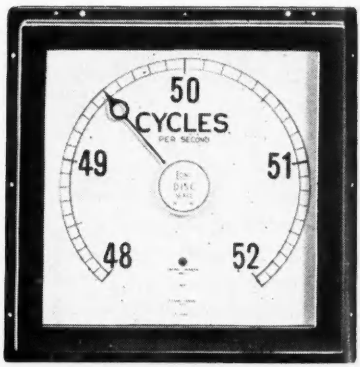

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ELECTRICAL REVIEW

27th FEBRUARY, 1953

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CLII • NO. 9

Faraday's Example

THE question asked of Michael Faraday as to the practical use of his discovery of electro-magnetic induction has been answered with increasing emphasis during the past seventy years. To-day it is easy to take for granted the innumerable benefits to the world at large which have stemmed from this discovery, and demonstrations of the " hows and whys " of electrical phenomena have much more than an entertainment value. Just as for the small proportion of the population who can be scientists or engineers, a retention of the common touch of humanity is necessary to a civilized conception of life, so for the bulk of the community a rational outlook calls for the cultivation of a scientific approach to day-to-day affairs. Acquaintance with the elementary principles of electricity, in view of its impingement upon domestic, transport and industrial matters, provides an unexampled means to the wider education of the public.

The Faraday Lecture, which was started by the Institution of Electrical Engineers in 1924, is well devised for that purpose, as essential features are the inclusion of demonstrations and experiments and the avoidance as far as possible of technicalities—methods which there is evidence that Faraday himself would have approved. This year's lecture, which was given by Mr. A. R. Cooper in London last week, takes a high position in the long series of brilliant expositions, and its success, like that of its predecessors, may be gauged by the large attendance (including a gratifyingly high proportion of younger members of both sexes) in each of the large towns in which it has so far been presented. Its main features were reported in our issue of 12th December on the occasion of its delivery in Manchester. The interest of the audience, first aroused by a simple but lucid explanation of the results of overloading generating plant (which were pleasantly referred to as matters of past history), was readily turned to fundamentals, such as the trapping of sunlight in the chlorophyll of vegetation and its

metamorphosis during the centuries into stored " packages " of heat energy. All the possible sources of electricity which the lecturer envisaged (including atomic fission) require, with one exception, mechanical means for cutting magnetic lines of force. The exception is the fuel cell, which if feasible would convert the chemical energy of fuel directly into electrical energy. Even so, Faraday's discovery here under consideration was by no means his only contribution to electrical knowledge and, overall, his work as an experimental scientist and his genius for making deductions from his numerous experiments will remain an abiding inspiration.

MAINTAINING QUALITY

There are many reasons for keeping a watchful eye on products as they evolve in a factory. Such control avoids waste, through an excessive number of rejects, and loss of customers through unsatisfactory articles which escape detection before leaving the works. This subject is dealt with in a report just issued by the British Productivity Council which results from a visit to the United States by a team of specialists. A number of useful recommendations are made. Above all it is stressed that there should be close liaison between inspection and management to ensure that when shortcomings are discovered there are adequate means of ensuring that remedial measures are quickly applied.

FLATTERING IMITATION

The domestic electrical apparatus manufacturers should take it as a compliment that the latest gas appliances follow so closely in appearance the designs of their electrical counterparts. At the " Gas in the Design for Living Exhibition " now being held at the Building Centre, Store Street, London, W.C.1, the gas equipment, in particular such items as cookers, reflector fires and convectors, is to a casual observer indistinguishable from similar electrical apparatus. Controls appear practically identical and the light colour schemes more generally associated with electrical apparatus are commonplace. Such features as warming drawers, drop-down doors, etc., are also now widely adopted in gas cookers.

EXCESSIVE TAXATION

The toll imposed by current rates of taxation upon industrial concerns requiring resources for development is well illustrated by the case of the English Electric Co. and its associates. The gross profits of the group for 1952, before providing for taxation, rose by nearly 20 per cent to £4,359,034. Taxation, at £2,909,516, was about 27 per cent higher than in 1951, and the group net profit for the year, amounting to £1,449,518, showed an increase of only 7 per cent, which was just about sufficient to maintain the 15 per cent dividend on the larger ordinary capital. This represents the reasonable rate of only just over 5 per cent at the present price of the stock. The need for tax relief to enable greater provision to be made for development is very apparent.

HIGHER AND HIGHER

By raising the cost of coal by 10 per cent the National Coal Board has started another cycle of price increases. Already the Iron and Steel Corporation is seeking authorization for immediate rises in the maximum prices of its products and the railways no doubt will also seek powers to recoup the extra burden placed on them which, in turn, will again send up the cost of coal to industry and the public. Electricity production costs will rise and although the operation of coal clauses will to some extent counterbalance this, an upward revision of tariffs may prove inevitable. Of course the same applies to gas.

STEEL DRUM MANUFACTURE

Application of "Rheemcote" Lithographic Process

A NEW continuous automatic process for applying paint finishes, with lithographed wording, etc., if desired, will greatly accelerate the production of steel drums at the St. Vincent Works of Rheem-Lysaght, Ltd., at Bristol.

Extending for a distance of 310ft, the Rheem lithographic printing and roller coating line just brought into service is at present laid out to deal with flat sheets for the bodies of 40 and 45 gal drums, roller coating them at a rate of 3,200 an hour and printing at a rate of 2,500 an hour. Ultimately sheets for "pails" (drums with removable lids used for grease, paint, putty, etc.) and 5 gal drums will also be treated.

Although the Hoe rotary lithographic metal decorating press with its associated Dexter automatic feeder forms the first unit of the "Rheemcote" line, the metal sheets, previously trimmed to correct size in slitting machines and guillotines, go first to the next unit in the line, the Wagner roller coater, which has its own separate feeder, for their priming coat. Then, if decorating is required, the sheets, after passing on down the line through a Stordy Engineering, Ltd. (Wolverhampton) drying oven to the stacker, are brought back to the head of the line for treatment in the lithographic press and then straight down the line again for the application of a finishing coat of varnish in the roller coater, further baking, and stacking: sheets which have received their priming coats and do not require decoration are taken straight from the stacker. The provision of a separate feeder for the roller coater enables the latter to be used independently of the printing press and allows full use to be made of its somewhat higher operating speed.

The Dexter automatic feeders serving the printing press and the roller coater are of identical design with a 7½ h.p. 1,435 r.p.m. motor driving the compressor and hydraulic unit. Limit switches operated by contact with the sheets form part of the transfer mechanism.

The lithographic press is driven through four V-belts by means of a 25 h.p. 1,450 r.p.m. motor, a 15 h.p. 715 r.p.m. motor with a Croft reduction gear being used to drive both the roller coater and the oven conveyor. Since drying is the most critical operation, the speed of the oven conveyor with the roller coater is first set by means of a variable speed gear, a "Selsyn" unit with an electronic control panel providing for synchronization with the printing press.

Electrical interlocks make it impossible to operate the feeders until the stacker at the discharging end of the unit is running, and all motors are automatically stopped in the event of a hold-up anywhere in the line. Overload protection is also provided where necessary. Besides the three normal push-button starters, there are emergency stop buttons at strategic positions all the way along the plant.

In the drying oven there are six heating zones giving maximum temperatures of 250–450 deg F according to the type of enamel used. The temperature in each zone is indicated and recorded by Negretti & Zambra instruments. Though gas fired, the oven is electrically controlled by Honeywell Brown "Protectoglow" equipment, with visible flame failure indication.

The "Rheemcote" lithographic line with rotary press and automatic feeder in the foreground

Each of the heating zones is equipped with an induced draught fan (with $7\frac{1}{2}$ h.p. English Electric motor) while the cooling zone incorporates twenty-six fans underneath to blow cold air up through the sheets, three large extract fans (5 h.p. each) removing warm air from the top.

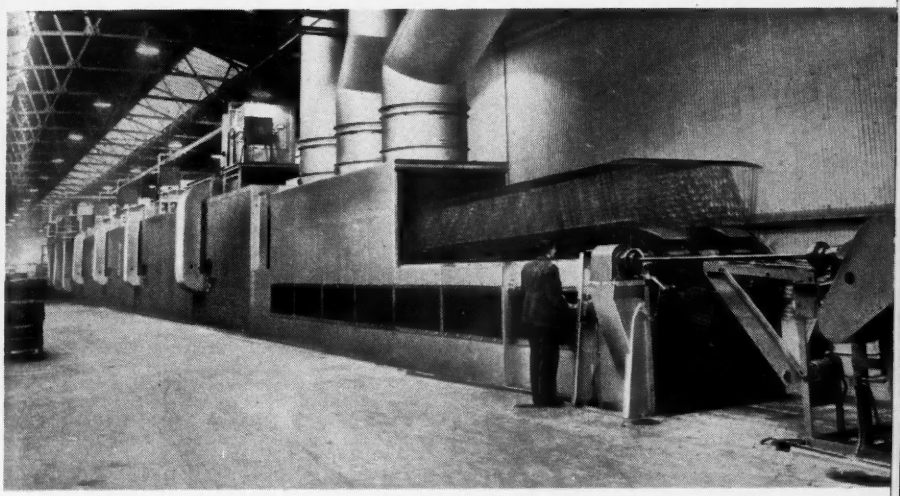
Emerging from the cooling section of the oven face downwards, the sheets are automatically transferred to a turn-over device which places them the right way up. Another machine, similar to the feeders referred to already but with no compressor, passes the sheets on to an automatic stacker, a torque motor being arranged to regulate the speed of operation in relation to the weight of the sheets on the turn-over device—a feature of special importance when starting up the plant.

At present not all the sheets used for the drums produced in the factory are decorated and enamelled by the method described above: some of the drums are still finished by the conventional spray painting process after the drums have been formed. Whether previously enamelled or not, however, the sheets forming the bodies are passed through a "Vacu-Blast" machine to ensure clean edges preparatory to welding. The generator of this unit is driven by a 15 h.p. motor. Steel grit under air pressure is passed through special reinforced hose into blast boxes through which the edges of the sheets pass. The grit is then sucked back by vacuum and reclaimed, any dust created being separated. Timing of the process is controlled by a solenoid actuated device.

Thus prepared, the sheets pass to a transfer table (fitted with a micro limit switch) whence they are pushed by means of a double-acting air cylinder automatically to the drum forming rolls. Here the sheets are rolled to the diameter required and passed on via an "up-ender," which is operated through another limit switch, to a belt conveyor. The shells are lapped and tacked into position by a spot welder before the welding of the side joint is carried out by means of a British Federal seam welding machine.

Utilizing a crank action, a double flanging machine (Uskside Engineering Co., Ltd.) driven by a 10 h.p. motor starts to flange the two ends of the drums. The swedges or rolling hoops are then introduced into the drum shells, and should side openings be required 50 ton horn presses are used.

The tops and bottoms, made in a separate section by means of a series of 250, 75 and 40 ton presses, are then placed in position, and the assemblies pass into a double-seaming machine where they are gripped by hydraulic pressure, are spun

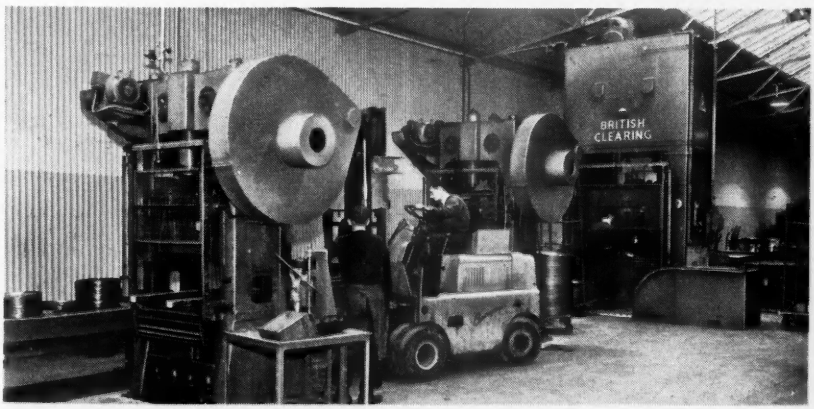


The exit end of the "Rheemcote" lithographic line showing turn-over device feeding the stacker

and by seaming wheels operating through cams both ends are double seamed. Operation of this machine, which incorporates a 40 h.p. G.E.C. main driving motor and a 15 h.p. Brook unit for the hydraulic gear, is by a system of solenoids and valves. Upended, the drums are placed on an air test table to receive an air pressure test of 7–8 lb/sq in, a soap-water solution sprayed on to the seams immediately revealing leaks.

At this stage painted and unpainted drums are separated, the former going along a conveyor to the chime spray unit, final inspection and dispatch department, the latter passing to a cleaning plant before spray painting. In the cleaning plant the drums receive three washes, consisting of heated " Bonderite " degreasing solution, a cold rinse and a heated chromic acid solution. The various washes are administered

Group of presses for making the tops and bottoms of the drums



Section of overhead busbar system feeding the various machines

to the drums by LaBour pumps driven by one 3 h.p. and two 2 h.p. English Electric motors.

After passing through a drying oven the drums are lifted by a pneumatically operated elevator to a rotating device which permits two spray painters rapidly to impart an even coating of paint all over the drums. The booth has a down draught fan system sucking away any overspray paint in the atmosphere. Another device operated by one of the sprayers ejects the drums from the rotator along and into the entrance of the stoving oven. Here they are carried on a conveyor right through a 100ft long stoving section and a 25ft long cooling section. As was the case on the "Rheemcote" line, the oven is fully equipped with flame failure control together with Foster temperature recorders.

Another up-ender, with limit switch, places the drums as they come from the oven on to a gravity conveyor which in turn feeds a powered conveyor leading to the chime spray unit. In this unit the chimes are touched up and the swedges are waxed to prevent damage in transit. A gravity roller conveyor takes the finished drums to the dispatch conveyor.

To supply the compressed air for such machines as the "Vacu-Blasters," welders, presses, flangers, seamers, testing and paint spraying plant there is a Consolidated Pneumatic compressor driven by a 120 h.p. Brush synchronous motor fitted with an Erskine Heap auto-transformer starter and a Cressall speed regulator on the exciter. This motor is also over-excited to assist in power factor correction.

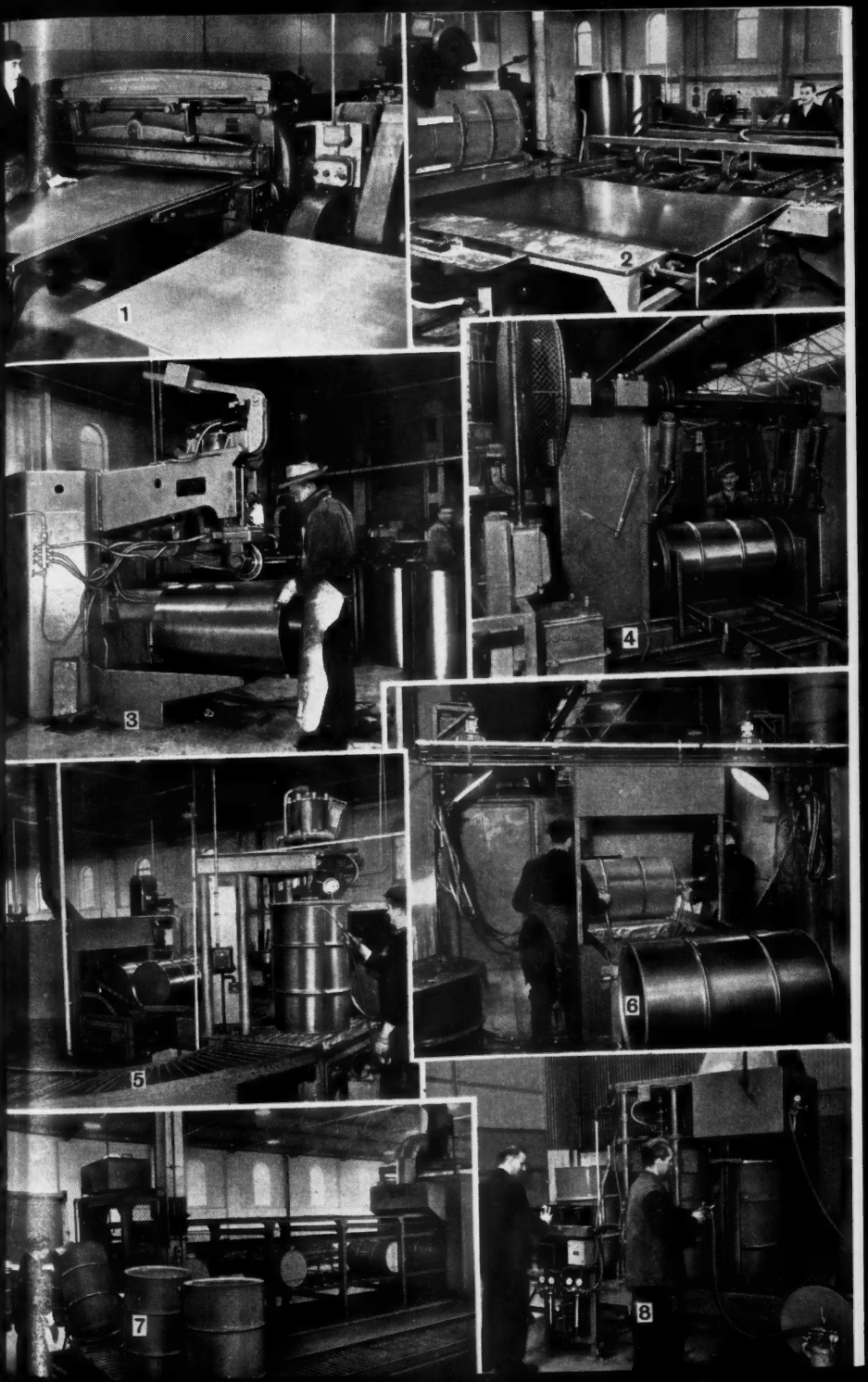
At present the output of the plant as a whole is restricted by the welding facilities to about 120 drums an hour. The duplication of the welding section will shortly permit the doubling of production, while plans are in hand for the introduction of a fully automatic welding machine to give eventually an output of 600 drums an hour.

The electrical installation was carried out by the South Western Electricity Board, Bristol Central District, which provides a supply at 6·6 kV taken through two 0·1 sq in feeders to an English Electric switchboard. Divided into two halves by a bus section switch, this switchboard at present feeds one 500 kVA 6,600/365 V transformer for the welding plant and one 750 kVA 6,600/365 V transformer for the remaining equipment. A switch has already been installed in readiness for a second 750 kVA transformer which will be required to supply the additional welding plant already referred to. The low voltage switchgear includes separate units for each of the welders and also the compressor, the remainder serving the overhead busbar systems from which all the other plant is supplied. Both the h.v. and l.v. switchgear, the transformers and the overhead busbar system were supplied by the English Electric Co., Ltd.

For the illumination of the factory Crompton Parkinson fluorescent fittings are used over parts of the "Rheemcote" line with B.T.H. reflector units serving the rest of the buildings.

We are grateful to the management of Rheem-Lysaght, Ltd., for giving us permission to inspect this plant and for assisting us in the preparation of this article.

(1) Guillotine used for trimming the sheets to the correct size. (2) The sheets forming the bodies are treated by "Vacu-Blasters" to ensure clean edges preparatory to welding. (3) Seam welder for completing the side joint after spot welding. (4) Double seaming machine for attaching the tops and bottoms to the bodies. (5) After pressure testing the painted and unpainted drums are separated, the former going along a roller conveyor for final inspection and the latter passing to a cleaning plant before spray painting. (6) Spraying booth, showing pneumatic elevator and rotating device. (7) Drums leaving the drying oven. (8) Chime spray where the chimes and seam weld are touched up and the swedges waxed to prevent damage in transit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Landlord's Lighting

Installations in Large Blocks of Flats

By A. V. LEIGHTON, Associate I.E.E.

THE electrical installation in block dwellings will include the provision of a number of points, the control and upkeep of which will be the direct responsibility of the property owner. The following notes may be helpful to architects and engineers when planning the engineering services which are required for this type of building.

The nature of the control to be provided may vary for different types of blocks of flats, but it will generally be necessary to cater for time switching control for the following circuit grouping:—

(1) *Exterior lighting.*—

(*a*) Points required on the elevation of the building to light approach roads and paths where the street lighting is inadequate or screened by trees or parts of the building.

(*b*) Lights to be provided for the general illumination of the building entrances and steps, or courtyards, cycle and pram stores, clubrooms, garages, etc.

(*c*) Any additional exterior lighting which may be needed for the protection of the tenants and public against projections, etc., including such illumination as may be required to prevent nuisances and generally to safeguard the property.

This exterior lighting should be carefully planned in order that, while performing its proper function, the number and wattage of lamps are kept to reasonable limits to avoid high running costs, because it will usually be necessary for this lighting to be maintained throughout the hours of darkness. This lighting and the circuit supplying it may be termed the all-night or long-hour circuit and for the purpose of calculating energy consumption may be taken as being switched on for 4,000 hours a year.

(2) *Staircase lighting.*—In buildings of modern design with large windows artificial staircase lighting should not be necessary in the daytime, but facilities should be provided to enable the caretaker to switch on lamps during very dark or foggy weather.

It is general practice for staircase circuits to be time-switched on soon after sunset and to remain on until midnight. In addition, in luxury flats, suitable time limit switches, usually of the push-button

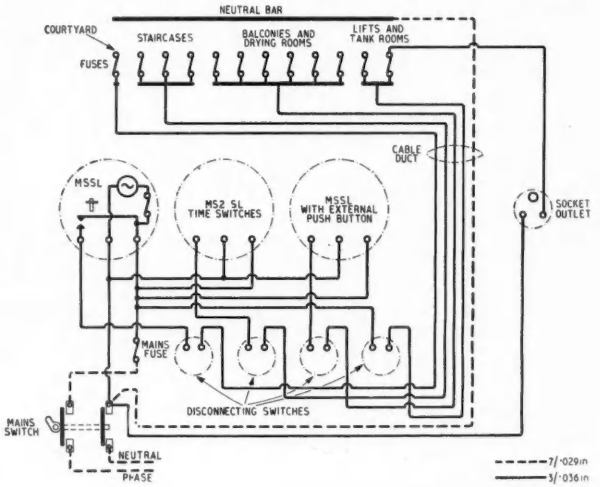


Diagram of internal wiring for a 12 fuseway unit fitted with three time switches

type, may be provided to be operated by a late homecoming tenant, the lights remaining on for a sufficient time to allow him to ascend the staircase.

In workers' flats arrangements are often made for switching the staircase lighting on from 6 a.m. until sunrise during the winter months, this arrangement being made for the convenience of early morning workers: it also avoids the risk of accident on dark mornings.

Usually, then, the staircase circuits call for two periods of lighting: from sunset until midnight and from early morning until sunrise, possibly with emergency push-button control.

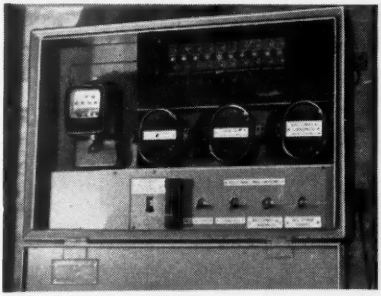
(3) *General lighting.*—Under this heading there are the lights in drying rooms, stores, wash-houses and on balconies, landings and in passages. Some of these general lighting circuits may have local control switches, but to prevent waste of electricity it is generally possible for the landlord to arrange for the supply to be cut off at 11 p.m. without causing any inconvenience to the tenants. In cases where balcony points are outside bedroom windows, switching off at 11 p.m. is usually appreciated.

For the staircase and general lighting the number of hours of "burning" may be reckoned as 2,000 hours a year. The electricity charges will, of course, vary according to the area of supply.

(4) Other circuits will be required without any form of time control; they will include the supply circuits to lift lights, motor and pump rooms, inspection lamp sockets and meter and boiler room lighting.

Wiring and Fittings

"Public" lighting installations of these kinds are usually carried out with v.r.i. or p.v.c. cables in heavy gauge screwed conduit, concealed wherever possible and generously provided with loop-in and draw-in boxes to facilitate any re-wiring that may be necessary. In the majority of buildings, and practical experience has proved this to be the best method, conduits of adequate wiring capacity are run horizontally from the meter cupboard to all the points on the ground floor. Vertical conduits are then run from point to point up through the various floors. The landlord's lighting fittings should in general be of the totally enclosed recessed or semi-recessed type to reduce maintenance cost



The lighting control unit (with the cover dropped) installed in the meter cupboard of a block of flats

and prevent unauthorized lamp removals.

The prismatic type of glassware is to be preferred for maximum illumination efficiency and control of direction of lighting, but the exterior of the glassware should be smooth and free from grooves or angles which collect dust and dirt and are difficult to clean. For the same reasons wire or other guards should not be fitted and the use of any type of bracket should be avoided as brackets nearly always spoil the architectural appearance of the building, attract stone throwing and kite strings and send up maintenance costs. The electrical and time control of the circuits may be carried out by the installation of a "block lighting control unit" such as that manufactured by Siemens Electric Lamps and Supplies, Ltd., which has been designed and used for this purpose for a very large number of installations in blocks of flats.

The control unit is accommodated in a welded sheet steel case 27in wide by 18in high, fitted with a drop down hinged door of dustproof design. The case is divided by steel partitions into four compartments, suitable cable ducts being provided for the internal wiring. The first compartment is designed to accommodate the Area Electricity Board's meter and is provided with a removable meter fixing plate. Below the meter a 9in by 6in plate provides fixing space for the circuit label. The second compartment houses a 30 A micro-gap main switch, main fuse (h.r.c. type) and four sub-circuit isolating or disconnecting switches. A socket outlet, for use with an inspection lamp, is provided on the side of the case together with a hook for the meter cupboard handlamp. In the centre

of the unit a mounting platform is welded in position on which are mounted standard Venner time switches driven by synchronous motors. The time switches are fitted with solar dials and are of the interchangeable plug-in type, fitted with single-pole fuses to protect the motor circuit. These time switches provide for the complete time control of the landlord's lighting as described. The top compartment of the unit contains the circuit fuses and a neutral bar. From four to fourteen 5 A fuseways may be fitted and an insulated front panel closes the compartment, the panel being slotted for the projection of the fuse carriers, which are of the "Wylex" pattern. The steel case of the unit is fitted with two steel battens for wall mounting and is provided with suitable conduit knockouts at the top and sides. Push-buttons are incorporated for manual operation during dark days or for emergency or testing purposes. These enable any section of the time controlled lighting to be switched on without interference with the clocks; the push-buttons are designed to close the contacts by cams and the clocks will automatically take over control should the manual operation be forgotten.

The control unit was designed to avoid the necessity for providing separate ironclad distribution boards, switches and lengths of interconnecting conduits or trunking in the meter cupboards and to make for a saving of time and labour during the erection of the installation. Its chief advantage however is that it provides a standard, neat and compact assembly of control which is flexible in operation and simple in maintenance.

Turbine Blade-Tip Clearances

Method of Measurement

MEASUREMENT of blade-tip clearances in aircraft turbines by a capacitance method formed the subject of a paper prepared by Messrs. I. A. Mossop and F. D. Gill (both of the Royal Aircraft Establishment) which was presented at a Measurements Section meeting of the Institution of Electrical Engineers in London last week.

The authors described an instrument which had been developed for use by airfield maintenance men in the checking of turbine-blade clearances, both in turbo-jet and turbo-prop engines. The measurements are made by plugging a cable into various capacitance pick-up points around the shroud ring and spinning the rotor, either by hand cranking or by the starter motor.

This instrument works on the capacitance principle but the measurement does not depend for its accuracy on the similarity between the pick-ups; balancing, calibration, and ultimately, measurement at a pick-up point are possible without moving the attachment cable, except when changing to the next pick-up. Clearances are indicated on a peak voltmeter, scaled to show the clearance being measured as a fraction of the value to which the instrument has been calibrated. The instrument selects the longest blade and measures its clearance.

The instrument has several novel features such as the use of a transformer placed part-way along the pick-up lead which is designed to make the whole lead parallel-resonant. This not only makes possible the measurement of minute capacitance changes at the end of a long cable, but enables a simple resistance bridge to be used for this measurement. The bridge is fed by a stable crystal-controlled 50 kc/s oscillator. With the present equipment it is possible to detect capacitance changes of about 0·003 $\mu\mu$F at the end of a cable 23ft in length which requires an overall capacitance sensitivity, $\delta \frac{C}{C}$, of 10^{-5}.

The method of calibrating the instrument results in the greatest accuracy of measurement for clearances near the calibration value, the estimated error being less than plus or minus 5 per cent. The underlying technique may have many other applications in measuring minute capacitance changes, particularly where the pick-up is unavoidably remote from the main measuring apparatus.

Engineering in Europe

Survey of Current Literature

THE advantages of h.f. methods of heating the work during welding and brazing are of an economic as well as of a technical nature and mainly due to the possibility of concentrating the thermal energy at the point where it is actually needed, which reduces the heat losses. On the other hand, the strict localization of the temperature rise of the material reduces deformation and thermal stresses to the minimum and thereby improves the quality and strength of the finished joints.

The methods available differ slightly in character according to the nature of the materials worked, since the range of materials is extremely wide. For metals the method is induction heating; for bonding operations on thermosetting plastics, dielectric heating; and for the jointing of heterogeneous materials, such as glass and metal, again induction heating. Much electronic apparatus and machinery has been developed for these various purposes, a typical selection of which is described and illustrated in this article.—" Applications of High-Frequency to Welding and Brazing," M. Descarsin, *Bulletin Soc. Franc. Electriciens*, 7th Series, Vol. 2, No. 23, pp. 655–662, November, 1952, in French.

Rectifier Voltage-Rise Suppression

The rise of the rectified voltage on no-load operation of rectifier installations with interphase transformers may be effectively suppressed by the use of saturable smoothing reactors. The most favourable conditions are obtained if the voltage across the interphase transformer equals about 0·4 of the phase voltage of the rectifier transformer. The problem may then be formulated as follows:—The most favourable size of reactor core to be selected from an available series of types and to be provided with the appropriate winding (number of turns) so that the saturation of the reactor produces the desired voltage of about 0·4 of the phase voltage. The undesirable voltage rise has a value $3/\pi\sqrt{2}U$ (where U is the effective value of the phase voltage of the rectifier transformer).

The calculation is based on an analytical expression of the magnetization curve of the iron. It is found that only the slope of the characteristic at the working point is required for the actual calculation. The essential parameters may be combined to obtain a convenient diagram with the aid of which the necessary selection from an available series of types may be made almost without any additional calculations.—" Calculation of Smoothing Reactors for Suppressing the Voltage Rise in Rectifier Installations with Interphase Transformers," W. Hartel, *E. und M.*, Vol. 69, No. 22, pp. 495–501, 15th November, 1952, in German.

Line Capacitors

While shunted capacitors are mainly used for p.f. correction, it is not generally realized how many different purposes series capacitors in a power system may serve. The most important are to increase the transmitting capacity of a line at a constant power factor, or to reduce the inductive voltage drop for equal transmitting capacity. But they may be, and are, also used for improving load distribution between parallel lines, voltage control of systems subject to sudden load changes (particularly frequent running-up of induction motors), and in rolling-mill drives, for reducing voltage oscillations in arc furnace circuits, etc. Among the possible disturbances series capacitors may cause are ferro-resonance phenomena in transformers (particularly on connecting idling transformers into a system), self-excitation of induction motors and the hunting of synchronous motors. The author presents a useful and simple theoretical comparison of series and shunt capacitors inserted for improving transmitting capacity in terms of degree of compensation, relative costs (referred to the increase of saleable power) and, finally, in

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates. —Editors, *Electrical Review*.

terms of the natural (theoretical) load capacity.—" Series Capacitors in Medium Voltage Distribution Lines," F. Barozzi, *Elettrotecnica*, Vol. 39, No. 10, pp. 495–505, 10th–25th October, 1952, in Italian.

Fire-proof Transformers

Prefaced by a short historical account of the evolution of power supply to coal mines, the main part of this paper concentrates on the development of mine transformers since the first world war, particularly the fire-proof so-called " air transformer " which uses as insulation materials class H silicone products. Their main advantages are improved moisture-resistance, high thermal stability, good mechanical strength and outstanding dielectric characteristics. The type-life is seven years with a maximum temperature of 220 deg C (compared with 105 deg C for class A and 130 deg C for class B insulating materials).

U.S.A. manufacturers of dry type transformers assume for those with class H insulation an average rise to 150 deg C and a hot spot rise to 180 deg C, for a maximum ambient temperature of 40 deg C. The paper reports on tests on the transformers described and gives loss figures and actual temperature rises measured. The output figures of corresponding types with class B and class H insulation are compared, one characteristic set of such values being 150 and 250 kVA, respectively. The article concludes with a description of mobile substations designed by the A.C.E.C., using air-type transformers, and of their high- and low-voltage switchgear equipment.—" New Trends in the Construction of Fire-Proof Transformers and Mobile Substations for Use Underground in Coal Mines," M. Fanvel and H. Demoulin, *Bulletin* Sci. Ass. Ing. Montefiore, Vol. 65, Nos. 5, 6, pp. 412–423, May–June, 1952, in French.

Dirty Line Insulators

The problem of dirty overhead line insulators under precipitation or in fog has more aspects than would be expected and has therefore received attention from many people for a considerable time. In fact, a summary and critical review of the literature of the subject has become overdue and the present authors have discharged this duty with undeniable success, quantitatively and qualitatively. Particularly valuable are their tabulations of the main constituents of industrial and other contaminations and the resistivities of their aqueous solutions, the analysis of the dangers involved, the graphed voltage distributions on dirty insulators and insulator chains, oscillograms of discharges and radiations from dirty insulators causing radio interference, the results of the authors' own laboratory tests and the apparently complete tabulation of all the " anti-fouling " insulator types suggested so far. All these, including the " stabilized " and " water-repellent surface " types, are extensively discussed. A bibliography of 93 references is given.—" The Problem of Overhead Line Insulators in Unfavourable Ambient Conditions," D. Zandbetti and G. Vischi, *Energia Elettrica*, Vol. 29, No. 11, pp. 697–713, November, 1952, in Italian.

Hazards in Mining Systems

This article describes German practice for the protection of mining electrical systems, particularly the earth lead and the neutral earthing systems which, however, cannot fully eliminate imperfect short circuits, so that protected and protective switches have to be used for the control of currents and voltages in the earth leads which on the occurrence of dangerous over-currents cut off the power. Other devices test permanently for insulation deficiencies, these being particularly required for the trailing cables associated with portable heavy equipment such as coal cutters. This problem was solved satisfactorily by protective circuits combined with special types of trailing cables, with pilot leads consisting of an inner sheath of conducting rubber and embedded copper wires.

Since the maximum permissible supply voltage underground, viz. 500 V, led to difficulties in the starting of motors and the control of slight short-circuit currents, permission was sought and obtained from the Inspectorate of Mines for moving the district transformer close to the coal face. In connection with the design of special h.v. flexible rubber cables and suitable protective circuits this measure will enable voltages up to 6 kV to be used safely underground. Further specialized protection systems were evolved for the portable lighting equipment used underground.—" Protection against Electrocution Dangers and Fire Hazards in Mining Electrical Systems," A. Stormanns, *Bulletin* Sci. Ass. Ing. Montefiore, Vol. 65, Nos. 5, 6, pp. 339–369, May–June, 1952, in German.

Heat Generation in Electric Motors

By "ROTOR"

IT is fortunate that most faults on motors give warning of impending failure by overheating. If the causes of overheating can be diagnosed and remedied in time many breakdowns and consequential losses can be avoided.

When any motor is running heat is generated due to the following losses:—

(*a*) Resistance losses in the various conductors, which are proportional to I^2R, where I is the value of the current and R the resistance of the conductor.

(*b*) Resistance losses due to induced eddy currents in the core plates which are linked with a changing magnetic flux, such as the stator and rotor cores of an induction motor, or the armature and pole shoes of a d.c. motor. These eddy current losses also are proportional to I^2R where I is the induced current and R the resistance of the path through which the induced current flows. The eddy current loss is proportional to $f^2t^2B_m^2$ and inversely to ρ, where f is the frequency of the alternations of the linked flux, t is the thickness of the core plates in a direction normal to the flux, and ρ is the specific resistance of the core plate material.

(*c*) Because of the fact that the energy necessary to produce a magnetic flux in a ferrous material is not all restored to the supply when the magnetic flux is reduced, energy is absorbed by core plates which are subject to changing or alternating magnetic flux. These hysteresis losses are due to what may be termed "magnetic friction," and cause heating of the material which is proportional to hB_m^df, where h is the hysteresis coefficient and depends on the magnetic substance, whilst the index d is generally about 1·6.

(*d*) Heat is created by friction at the bearings. This loss is comparatively small in the case of ball and roller bearings. In sleeve bearings the loss due to fluid friction is proportional to $DLV_b^{1.5}$, where D and L are the diameter and length of the bearing respectively and V_b is the peripheral speed of the shaft in its bearing. For well designed sleeve bearings the loss in watts may be about equal to $0{\cdot}3\ DLV_b^{1.5}$, where D and L are in cm and V_b is in metres/sec.

(*e*) In motors which employ brushes heat will be created by brush friction. This loss (in watts) may be taken as $0{\cdot}0059\ NWTP\mu DS$, where N is the total number of brushes, W the width of brush (in), T the thickness of the brush (in), P the pressure (lb/sq in) normal to the commutator or slip rings, μ the coefficient of friction, D the diameter of the commutator or slip rings (in) and S the shaft r.p.m. As may be seen from Fig. 1, μ depends on the speed of the commutator or slip rings, and also on the constituency of the brush.

There is also loss of power due to windage, which depends on the design of the armature and fan, and on the speed. It is usually proportional to S^n, where S is the speed and n is a factor which is generally between 2 and 3. However, we are little concerned here with such losses, since they are incurred in cooling the motor.

Heat Dissipation from a Motor

Because of heating losses the temperature of a motor gradually rises. When the motor is first started up from cold the heat

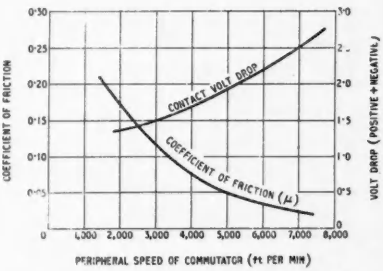


Fig. 1—Contact volt drop and coefficient of friction of a graphite brush at 40 A and 2 lb pressure per sq in

dissipation from the cold machine will be low and can be ignored, the rate of rise of temperature of the parts of the motor will then mainly depend on the rate of heat generation resulting from the losses, the thermal capacity of the parts of the machine, and the conductivity of the materials of which the motor is built. However, as the temperature of the motor gradually rises heat is dissipated from the machine at an increasing rate, to some degree by radiation, to an appreciable degree by convection air currents from the case, but mainly by conduction by air in most machines.

Radiated heat is transferred from one body to another at a lower temperature by a kind of wave motion in the ether without heating the intervening medium. The heat which is dissipated from a surface by radiation depends on its absolute temperature T, and on the character of the surface. The heat radiation from a body per sq ft/min is proportional to $c(T_1^4 - T_2^4)$, where c is the coefficient of radiant emission, T_1 is the temperature of the body and T_2 the temperature of the surroundings.

Convection is the process whereby heat is transmitted from the motor by currents of air caused by the heating of the air by the motor. Experiment shows that a rough surface dissipates heat by convection more readily than a smooth one and the heat dissipation is proportional to $T_1 - T_2$. High air speeds are an advantage in obtaining air turbulence instead of streamline flow.

Some heat may be conducted from machines by metallic structures in contact with the motor but this is usually negligible in comparison with the heat that is carried away by air which is blown over or through the motor by the rotating parts, usually augmented by a cooling fan. The amount of heat which is dissipated in this way is proportional to the quantity of cooling air passed through the motor and to the temperature rise of the air in passing through or over the motor.

Temperature Rise

It follows, therefore, that when a motor is started from cold and is run on a steady load and supply the rate of increase of temperature falls, due to increasing heat dissipation. If the motor, or one of its parts, is sufficiently homogeneous the exponential law may be applied.

If H is the thermal capacity in grammes (mass times specific heat), C the rate of heat dissipation in watts from the body per deg C rise of temperature, θ the temperature rise at any time t and P the power wasted in the motor in watts, then the final temperature rise θ_m will be equal to $\frac{P}{C}$.

Heat is generated more rapidly than it is dissipated when the motor is first started from cold, the rate of heat absorption by the motor being equal to $P - C\theta$. The rate of increase of motor temperature $\frac{d\theta}{dt}$ will be equal to $\frac{1}{4{\cdot}2H}(P - C\theta)$, since 4·2 watt-sec equal 1 calorie. From this we can obtain $\theta = \frac{P}{C}(1 - e^{-\frac{Ct}{4{\cdot}2H}})$, i.e., θ will be equal to $\theta_m(1 - e^{-\frac{t}{T}})$, where T is the heating time-constant which is equal to $\frac{4{\cdot}2H}{C}$. T depends on the thermal capacity of the machine and inversely on the rate of heat dissipation. It will thus have a fairly low value for a small highly ventilated motor and a relatively high value for a large totally-enclosed motor. The temperature rise θ at any time t from the start may be expressed as $\theta = \theta_m(1 - e^{-x})$, where $x = \frac{t}{T}$. This method enables Fig. 2 to be used in various ways. The scale A can be used to give the complete temperature curve when starting from cold. The scale B can be used to give the portion of the temperature curve starting from 90 per cent of maximum temperature rise, while scale C can be used from 99 per cent of maximum temperature rise. The heating time-constant T determines the initial rate of temperature rise when $t = 0$, i.e., T is the time in which the temperature rise attains 0·632 of its maximum value θ_m.

While a motor is not a homogeneous body, and heat is not uniformly produced in the machine, the temperature rise does generally closely follow the exponential law as may be seen from Fig. 3. The heating time-constant of the core of the motor in question is 25 deg C in about 105 min, corresponding to $\frac{25}{0{\cdot}632} = 39$ deg C final temperature rise. A very much lower value for T would apply in the case of a highly ventilated high speed motor, and a

higher value for a large totally-enclosed low speed motor. Thus the former motor will rapidly reach 63·2 per cent of its final temperature rise, while the latter machine will take longer to reach the same percentage of its final temperature rise.

Permissible Temperature

Thus the temperature of a motor gradually reaches a steady value at which heat is dissipated from the motor at the same rate as it is generated in the machine. The rating of a motor is governed by the temperature rise, i.e., the loading must not be so great that there is a risk of rapid deterioration and premature failure of the insulation. The permissible temperature depends on the type of insulation used. It is considered that the maximum temperature of Class A insulating materials should not exceed about 95 deg C for continuous working. If the temperature exceeds this value for long the insulation is liable to become brittle and fail through vibration or other causes. Such materials comprise enamel, cotton and silk which have been impregnated with varnish. Class B insulating materials, which comprise mica, asbestos and similar inorganic materials in built-up form combined with a binding cement, can safely be worked at higher temperatures.

The temperature rise of parts of a motor may be measured in various ways. When measured by a thermometer applied to the surface at one point the temperature indicated is merely a surface temperature at that point. When measured by means of an embedded temperature detector, consisting of a thermocouple or resistance coil, the indication refers to the temperature at one internal point only. Since the resistance R of a winding at a temperature T is given by $R = R_0(1 + \alpha T)$, where R_0 is the resistance at 0 deg C and α is the resistance temperature coefficient, it is possible to estimate the temperature rise of a winding from hot and cold measurements of its resistance. However, the value obtained is merely the mean temperature rise.

It will be understood that the temperature values obtainable by any of these methods are likely to be lower than the actual temperature at the hottest point of the windings, which is the weakest link. Even if an embedded temperature detector is placed at a point where experience correctly shows that the highest temperature is obtained, insulation difficulties may prevent the detector reaching the maximum temperature. In consequence the measured temperature rise of parts of motors must be kept at lower values than the actual permissible "hot-spot" temperature if premature failure is to be avoided.

In this country the continuous rating of motors over 1 h.p., other than totally-enclosed motors, is based on a temperature rise of 40 deg C for the cores and windings of motors which are insulated with Class A materials, with 50 deg C for fractional h.p.

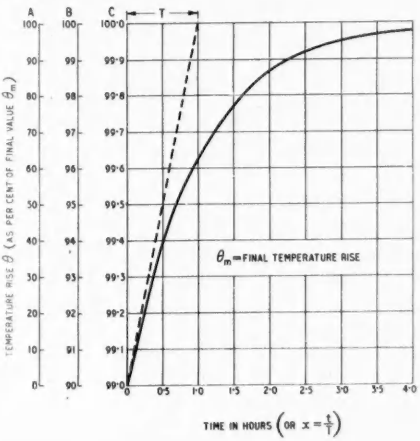
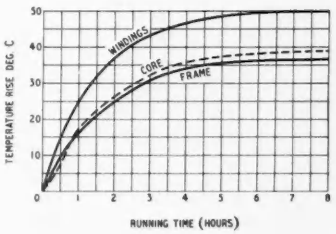


Fig. 2 *(left)*—**Temperature-rise curve**

Fig. 3 *(below)*—**Temperature-rise-time curves for a small totally-enclosed induction motor**



motors. In the case of totally-enclosed motors the corresponding temperature rise for machines over 1 h.p. is 50 deg C. For motors over 1 h.p. which are insulated with Class B materials the basic temperature rise is 65 deg C for totally-enclosed motors and 50 deg C for motors with other enclosures, these values referring to temperatures measured by thermometers.

Overload Capacity

Where the temperature of the cooling air does not exceed 35 deg C most new motors built in this country will withstand 25 per cent overload torque for the following periods without damage after reaching the temperature rise corresponding to normal operation:—

2 hours for motors of 10 h.p. and over per 1,000 r.p.m.

½ hour for motors of 4 to 10 h.p. per 1,000 r.p.m.

15 min for motors of 1 to 4 h.p. per 1,000 r.p.m.

However, 1½ to 5 h.p. four-pole ventilated induction motors for refrigerator condenser units (other than fans) should be capable of 25 per cent continuous overload in an ambient temperature of not more than 40 deg C. Motors which are short-time rated, and all totally-enclosed motors, should not be expected to carry a sustained overload. The significance of the speed in this connection arises from the fact that the physical dimensions and the heat capacity of the motor are dependent on the designed speed to some degree. Thus a 10 h.p. 3,000 r.p.m. motor would generally be appreciably smaller than a 10 h.p. 1,000 r.p.m. motor, and could be expected to have the same percentage overload capacity as a 3½ h.p. motor at 1,000 r.p.m., i.e., 25 per cent overload for 15 min.

New fractional horse power motors which are built to B.S. 170 and are coupled to propeller fans or centrifugal loads need have no overload capacity, while other continuously rated f.h.p. motors built to this specification should be capable of 25 per cent overload torque for 5 min. However, an additional requirement in this specification is that four-pole 50 or 60 c/s continuously-rated induction motors of ⅛ to 1 h.p. for refrigerator condensing units, other than fans only, shall be capable of 40 per cent overload torque for 30 min in an ambient temperature of up to 40 deg C. Further details may be obtained from B.S. 168 and 170 obtainable from the British Standards Institution.

Conductive Ceramic

A CONDUCTIVE ceramic known as "Caslode" has been developed by the Plessey Co., Ltd., Ilford, Essex. It is a white homogeneous material and is capable of absorbing power at centimetre and millimetre wavelengths, and can thus be used effectively for high power dummy loads and attenuator pads in waveguide applications. "Caslode" is a true semiconductor, and does not contain dispersed conductive particles. At 3·2 cm its dielectric constant is about 20, and the loss angle 10 to 20 deg.

During manufacture the material is fired at a high temperature to form a homogeneous structure which is stable under extreme conditions of temperature and humidity. Its thermal shock properties are excellent, and its coefficient of linear expansion is 6×10^{-6}/deg C. Mechanically it is similar to porcelain but can be ground and shaped more readily. The raw materials are formed into the required shape before firing and precise dimensions as well as a good surface finish are subsequently obtained by wet grinding.

High power dummy loads of this material have been developed to meet the demand for a matched waveguide termination capable of absorbing high powers without the necessity for water cooling. Wedge shaped components have been designed to operate in the common sizes of waveguides. Recent measurements indicate that units originally developed to give a match of about 0·95 and to dissipate about 100 W mean power at 3 cm can absorb 250 W mean power without any appreciable change in matching properties.

Where a load must occupy the minimum possible space "Caslode" can be formed into short wedges (e.g. 5 cm long for X-band waveguides) which give a match better than 0·85 and an attenuation of the order of 30 db.

The "Caslode" attenuator pad is still in the experimental stage, but units of the slot insertion type have been produced, having an attenuation figure of 28 db with a match of 0·95. These units have been tested up to a mean level of 15 W dissipation, and could probably absorb a higher level of power. Similar materials are being developed as high wattage resistors and current limiting negative temperature coefficient resistors.

VIEWS on the NEWS

By REFLECTOR

IT is reported that the 80-ton transformer for the Irish Electricity Supply Board to whose protracted voyage I referred a week or two ago has now arrived at Dublin. It will be remembered that when the transformer reached that city from the manufacturers it was found that the port's 100-ton crane was out of action and so the ship went on to Belfast where the transformer was unloaded. The crane has now been repaired and so it was possible to trans-ship the transformer. All this must have added considerably to the cost.

* * *

Electricity is too often the scapegoat when the causes of fires are unknown—in India as well as in this country. Recently the following paragraph appeared in an Indian paper:—

> "The recent fire at Walkeshwar was, I understand, the result of defective wiring in the electrical connections. Other reasons are also suspected and investigations, I believe, are afoot."

Surely the writer could not have been more guarded or more vague in making his doubtful accusation.

* * *

The deletion by the Americans of the second "i" from aluminium is apparently a reversion to one of the names for the metal originally proposed by Sir Humphry Davy. It is said in the *Manchester Guardian* "Miscellany" that Davy found it difficult to settle upon a name for his discovery. He first employed the term "alumium." This was before he had actually produced the metal; later he christened it "aluminum." But within two years "aluminium" had been adopted as being "more classical."

* * *

I have recently made reference to the trouble caused to electricity consumers with prepayment meters by the shortage of shillings. Now I see that the Chancellor of the Exchequer has been asked if he is aware that on account of this acute shortage street vendors in Glasgow are selling shillings for use in slot meters for fifteen pence each. What is coming over the Scots?

* * *

British Electricity reminds its readers that at Bankside on the south bank of the Thames at Southwark there were once bear gardens where dogs were set to worry bulls and bears (not the Stock Exchange types). "To-day," says *British Electricity*, "although bear-

baiting is no more, there is still much of interest at Bankside, for it is there that the Authority is having built the only major oil-burning power station in this country." For this reason, after a long interval, bear-baiting has been superseded by B.E.A.-baiting by the lay Press and others.

* * *

It was recently reported that a scheme had been devised by the London Electricity Board for the reorganization of its area. This has naturally caused people in other electricity areas to wonder, but I see that the staff of the South Eastern Board has been assured by the chairman that no such alterations are proposed in the organization of that Board.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Council of the Institute of Welding has awarded the Sir William J. Larke Medal for 1952 to **Mr. J. Rannie,** M.Sc., M.I.N.A., for his paper "Shipyard Changes, with special reference to Steelwork Construction in Oil Tankers." Mr. Rannie is welding engineer to John Brown & Co., Ltd.

Lord Latham, chairman of the London Transport Executive, has informed the Minister of Transport that he has decided to return to his professional practice when his present term of office as chairman expires at the end of September next.

Mr. W. E. Pattman has been appointed purchasing manager of Bakelite, Ltd., and **Mr. J. M. Lassen** becomes sales manager for "Vybak" p.v.c. materials.

Mr. Pattman joined the Damard Lacquer Co. in 1921 and soon after its transformation into the present company became assistant to the works manager. Later he took up the post of sales development engineer and started the company's Sales Development Department. During the war he was seconded to the Plastics Control Section of the Ministry of Supply, returning in 1945 as sales development manager.

Mr. Lassen joined the company as an engineering trainee in 1940, before serving with the Royal Navy. Returning in 1946 he was appointed to the new "Vybak" thermoplastics unit and has since been concerned with developing sales of these materials.

Mr. G. Morris, Mullard area representative for London and the Home Counties, recently completed twenty-five years with the Mullard organization. To mark the occasion, Mr. L. A. Sawtell, commercial manager, Entertainment Valve Department, presented Mr. Morris with an inscribed gold watch and a cheque. The presentation was followed by a luncheon.

Mr. Miles Beevor, managing director of the Brush Electrical Engineering Co., Ltd., left England on 20th February on a tour of India. He hopes also to visit Pakistan. He will return on 25th March.

Mr. Frank Greenshields, A.M.I.E.E., is leaving for Australia to-day (Friday) to take up duties at the Sydney Branch of Johnson & Phillips, Ltd. Mr. Greenshields has been a senior member of the J. & P. London sales staff since 1947.

Mr. C. A. Smeed, L.R.I.B.A., M.Inst.R.A., civil engineer and architect of the Eastern Division of the British Electricity Authority, retired on 7th February after thirty-nine years in the industry. Before vesting day he held a similar post with the Northmet Power Co. and was responsible for the design and building of the majority of the Northmet showrooms and offices and approximately 1,000 substations. Mr. Smeed was also responsible for the design of the Rye House generating station and supervised the civil engineering works.

Thorn Electrical Industries, Ltd., announces the following appointments in the Atlas Lighting Division :—**Mr. J. Martin,** Associate I.E.E., has been appointed north-western area technical sales manager, operating from Manchester. Mr. Martin, who has been with the company for seven years, is a past-chairman of the Leicester Centre of the Illuminating Engineering Society, and the immediate past-chairman of the Manchester Centre of the Society. **Mr. J. Duffield,** an Atlas lighting representative in the south-west of England for many years, becomes south-western area sales manager, operating from Cardiff, while **Mr. F. Roberts,** who has previously been area sales manager in Cardiff and assistant area sales manager in Manchester, is now north-western area sales manager for the company and is operating from Manchester.

Mr. J. Martin

Mr. J. Duffield

Mr. F. Roberts

Messrs. **R. L. Basset, W. G. Patterson, C. J. N. Borg** and **H. E. Humphries** have joined the board of Alfred Graham & Co., Ltd. **Sir Hubert Gough** having relinquished his seat on the board, Mr. H. E. Humphries has been elected chairman. **Mr. E. E. Smith** has relinquished the managing directorship to become consultant director, and **Dr. J. N. Aldington** has been appointed executive director.

Mr. **G. G. Savill** and **Mr. L. R. Johnston** have been appointed to the board of C.A.V., Ltd. Mr. Savill joined C. A. Vandervell & Co., Ltd., as it then was, as an apprentice on leaving school in 1916. On completing his apprenticeship, he served in the laboratory until 1929, when he transferred to the Sales Department as a technical representative. During the last war he served with the rank of major as assistant to the Chief Inspector of Electrical and Mechanical Equipment. He returned to C.A.V. in 1946, and took a leading part in developing equipment for the fighting services. Among his many duties Mr. Savill was responsible to the board for exhibitions.

Mr. G. G. Savill

Mr. Johnston joined the company in 1937 as a chartered accountant, and also acted as assistant to Mr. Mackillop, who was secretary of the company at that time. In 1947, when Mr. Mackillop retired, Mr. Johnston succeeded him as secretary.

Mr. G. B. Alvey has been elected to the board of **Mather & Platt, Ltd.** Mr. Alvey was at one time in charge of the Electrical Design Department, and during recent years has been in charge of the electrical section of the company's business. He will continue to be responsible for the work of the Electrical Department.

At the recent Hotel and Catering Exhibition competitions which were held in Manchester, **Mrs. Annie Page,** head canteen cook at Stockport power station, won all three sections in one class (industrial section).

Mr. **G. C. Handley** has been appointed London area manager of Contactor Switchgear, Ltd.

Three performances of "The Morning Star," by Emlyn Williams, were given by the **G.E.C. Dramatic Society** at the Fortune Theatre, London, W.C.2, last week. This somewhat sombre wartime play severely taxed the abilities of the players, but in their various degrees they were equal to the task. Betty Michell, a mainstay of the company, was excellent as Mrs. Parrilow (a quietly heroic middle-class matron) and Florence Scantlebury as Mrs. Lane (a "daily" help) backed her most effectively. Richard Anson as Cliff, Mrs. Parrilow's doctor son, Jean Wilson as his wife, with Sybil Whittall (Wanda Baring) intervening, formed an interesting triangle. Dudley Binnington, as the veteran Dr. Datcher, paired well with Keith Clifton as his batman (Brimbo Watkyn) and William Peacock rounded off the cast as Sir Leo Alvers. As most of the action takes place during air raids the sound effects man had a busy time. The production was by Evelyn Watts.

The first anniversary dinner of the Twenty-five Year Club of the **Pressed Steel Co., Ltd.,** was held recently in the ballroom of the factory at Cowley. Members of the club consist of directors, executives and works and office employees who have been in the company's service for an uninterrupted period of at least twenty-five years. A total of 139 additional persons qualified for membership and were presented with badges and gold watches by Major A. Pam, chairman of the company. Those present included Mr. A. L. Shuttleworth (managing director), Mr. W. E. Lambourn (director and buyer), Mr. R. Craig (works director) and Mr. F. E. Cairns (director and secretary).

The first aid team from Barton generating station again won first place in the North Western District of the **British Electricity Ambulance Centre Competition** held at Preston on 7th February. The team will represent the North Western District in the finals to be held in London on 25th March.

A luncheon was given by Mullard, Ltd., at the Savoy Hotel, London, on 28th January, in honour of **Dr. C. F. Bareford,** who is relinquishing his post as head of the Mullard research laboratory, Redhill, Surrey, to

Mr. S. S. Eriks, managing director of Mullard, Ltd., with Dr. C. F. Bareford at a farewell party recently held at the Savoy Hotel, London

become chief superintendent of the Long Range Weapons Establishment in South Australia. A number of senior executives of the company were at the luncheon to say good-bye to Dr. Bareford, and Mr. S. S. Eriks, managing director of Mullard, Ltd., presented him with a memento of his service with the company.

A dinner and dance to celebrate their twenty-first birthday was held by **Asbury, Brodie & Co., Ltd.**, distributors of electrical resistance materials, stainless steel, cadmium, nickel anodes, etc., on 6th February, at the New Inns, Handsworth, Birmingham. Among the guests were Mr. R. M. Parry (managing director, British Driver-Harris Co., Ltd.), Mr. I. A. Bailey (managing director, Henry Wiggin, Ltd.) and Mr. G. Tinker (managing director, Birlec, Ltd.). Mr. Parry proposed the toast of the company and Mr. E. W. Asbury, founder, replied.

The amateur boxing section of the **Telcon Social and Athletic Club** held an open tournament in the works canteen of the Telegraph Construction & Maintenance Co., Ltd., on 19th February. Over 450 employees and their friends attended. The prizes were presented by Mr. F. Leighton, general manager and president of the Club.

The North Staffordshire Branch of the **Electrical Industries Benevolent Association** is holding its annual ball at the Grand Hotel, Hanley, on 6th March. Tickets can be obtained from Mr. C. T. Whittaker, A.C.I.S., Midlands Electricity Board, 31, Kingsway, Stoke-on-Trent.

The Berks, Bucks and Oxon Branch of the Association is holding its fourth annual ball at the Olympia Ballroom, Reading, on 27th March. Tickets (7s 6d single, 12s 6d double) can be obtained from Mr. L. H. Waters, c/o Southern Electricity Board, Market Place, Reading.

The annual dinner and staff party of **Hurseal, Ltd.**, was held recently at Verrey's Restaurant, London. Afterwards the party adjourned to Hurseal's basement showroom to continue an enjoyable evening. Mr. F. S. Bassett, chairman, made a short speech thanking the staff for their co-operation.

OBITUARY

Mr. Malcolm Gordon, who was chairman of the Electricity Board for Northern Ireland for many years until his retirement in 1945, died on 12th February at Clonmore, Lisburn. He was a leading figure in the Northern Ireland linen industry.

Mr. H. B. Fergusson.—G. A. Harvey & Co. (London), Ltd., announce the sudden death on 20th February of their senior director, Mr. H. B. Fergusson, M.I.N.A., M.I.Mech.E., M.E.I.(Canada). Mr. Fergusson was educated as a mining engineer, but later had a varied career, largely in railway work. For four years he was a consulting engineer on hydro-electric plant and railway electrification projects in Spain. Mr. Fergusson joined G. A. Harvey & Co. in 1933 as manager of their Heavy Construction Department, and was very largely responsible for the growth and development of their activities in the oil, chemical and heavy engineering industries. He was appointed a director in 1938.

Mr. J. W. H. Livett.—The death occurred on 31st January of Mr. J. W. H. Livett, who had been with Johnson & Phillips, Ltd., for forty-three years, and for the past thirteen years had been the company's chief of technical sales (switchgear); he had represented the company on B.E.A.M.A. switchgear committees. Mr. Livett, who was fifty-seven, leaves a widow and son.

Mr. James Arthur Peters, founder and managing director of Petbow, Ltd., died on 18th February at the age of sixty.

Mr. M. F. Frankenburg.—The death occurred on 11th February of Mr. Merton Francis Frankenburg, chairman of the Greengate & Irwell Rubber Co., Ltd., from 1926 to 1951.

WILLS

Mr. B. E. Stott, A.M.C.T., A.M.I.E.E., M.I.B.F., Llandudno, late managing director of Ferrous Castings, Ltd., Warrington, who died on 20th October last, left £12,300 gross (£12,153 net).

Mr. L. Brooke, manager of the Leeds branch of W. T. Henley's Telegraph Works Co., Ltd., who died on 9th October last, intestate, left £3,150 gross (£3,030 net).

Mr. W. H. Good, electrical contractor, who died on 15th November last, left £7,721 gross (£7,650 net).

Sir Sidney William Clift, chairman of Lan-Bar, Ltd., who died on 18th October, left estate "so far as can at present be ascertained" valued at £75,609 gross (£21,981 net).

Major G. K. Field, who contributed notably to the design of the modern military tank, and assisted in the installation of the first sound film equipment in London, and who died on 19th November, left £1,127 gross (£1,089 net).

Mr. S. T. Buer, a member of the headquarters staff of the technical director of Standard Telephones & Cables, Ltd., who died on 29th October, left £11,521 gross (£11,460 net).

Mr. J. E. Ellis, late borough electrical engineer of Morley, who died on 2nd October last, left £8,367 gross (£7,779 net).

Mr. J. Orton, Leicester, electrical engineer, who died on 29th September last, left £22,388 gross (£21,077 net).

PUBLIC LIGHTING NOTES

Further Improvement Plans

A GOOD example of road lighting is that along the Sutton by-pass road, a main artery between London and the coast. Designed by the borough engineer and surveyor of Sutton and Cheam (Mr. N. H. Michell), the installation comprises Crompton " Aries " lanterns equipped with 140 W sodium lamps and carried on Stanton No. 6B columns. A total of 156 lanterns are used along nearly four miles of road to give the remarkable uniformity of road brightness, having regard to the 44ft width of the carriageway, shown in the accompanying illustration. With the " Aries " lantern light control is by means of a cylindrical crystal glass refractor unit held between cast end-plates with extension arms for suspension from a horizontal bracket tube. The prism formation in conjunction with an internal reflector ensures light control through 360 deg and the dispersion of light over so large a refractor area provides a low source brightness, while rotation of the refractor unit between the end-plates allows adjustment of the angle of elevation of the main beams with respect to road gradients, for which purpose a calibrated scale is provided.

BRAMPTON (Cumberland) Parish Council is approaching the Electricity Board on the question of converting the street lighting from gas to electricity.

A new lighting installation, comprising 26 fluorescent lamps, has been switched on in Abington Street, NORTHAMPTON. Previously the lighting was by gas lamps.

DARLINGTON Corporation has accepted the tender of the North Eastern Electricity Board (£1,750) for the erection of street lighting standards in Salters Lane.

CHESTERFIELD Town Council is to improve street lighting at junction of Whittington Hill and Broomhill Road, erect 75 lamps on the new Hady Lane estate (£1,879) and erect 100 on the Old Whittington estate (£2,446).

The Electricity Board of Northern Ireland has submitted four lighting schemes to the Urban Council of OMAGH, Co. Tyrone, ranging from £5,353 for fluorescent lighting of the two main streets to £12,769 for, in addition, group " B " fluorescent or mercury lighting for the rest of the town.

LUTON Highways and Planning Committee proposes to install sodium lighting in Beechwood Road (£3,800), Kingsway (£1,750) and Sundon Road (£550).

NARBOROUGH (Leics) Parish Council proposes to convert a further 14 street lamps from gas to electricity this year and the remaining 40 next year.

It is estimated that street lighting in BELFAST will cost £235,500 in the coming financial year, an increase of £17,300 as compared with the current year.

BARNSTAPLE Corporation is to prepare a scheme for the improvement of the street lighting in the Rolle Street and Braunton Road area.

BEXHILL-ON-SEA Highways and Works Committee has approved a scheme for the installation of wall-mounted twin-tube fluorescent lighting in St. Leonards Road at an estimated cost of £536.

The Ministry of Transport has approved the NEWBIGGIN (Northumberland) U.D.C.'s £3,817 street lighting scheme for the East End of the town.

The city engineer (Mr. J. B. Bennett) told a Press conference at BRISTOL recently that a street lighting experiment was being carried out in Southmead Road. Instead of installing 140 W sodium lamps 60 W lamps were used, mounted

A section of the Sutton by-pass road illuminated by sodium lamps in Crompton " Aries " lanterns

at 15ft instead of 25ft. Each unit cost about £45 as against £65. Spacing of the lamps was modified to make up the lower power. Drivers, especially bus brivers, were pleased with the lighting and it was proposed to extend it.

ETON R.D.C. has approved in principle a scheme estimated to cost £1,910 for the provision of electric street lighting in Eton Wick Road.

RADCLIFFE Corporation has approved a scheme estimated to cost £2,500 for improvements to the street lighting in Bury Road.

ST. ALBANS City Council has decided to include in its draft estimates for 1953–54 a scheme for improved lighting of the A6 road. The estimated cost is £9,650.

SPALDING U.D.C. is to apply for sanction to borrow £2,000 to cover cost of new trunk road lighting scheme.

Schemes are to be prepared for the provision of improved street lighting in Hamilton Road, Wellington Road and Staplegrove Road, TAUNTON.

Provision of sodium lighting along the Bristol–Exeter trunk road at WELLINGTON, Somerset, is recommended.

BROWNHILLS (Staffs) U.D.C. reports that the Ministry of Transport has approved a scheme for the modernization of the lighting in the High Street.

CHIPPENHAM Corporation is recommended to approve a scheme, estimated to cost £3,468, for the provision of street lighting in Hungerdown Lane from Bath Road to Bristol Road.

Inventions Exhibition

OVER a hundred inventions can be seen at the Central Hall, Westminster, where the Modern Inventions and New Ideas Exhibition is being held for the first time since 1938. Among items of electrical interest are an automatic egg boiler, a cable-operated electric power hammer, a refrigerated display cabinet, a combined burglar and fire alarm, a heated draining board, an improved ceiling rose which can be wired on the bench and inserted into the permanent fitting by a simple turning action, a non-metallic heating element made from carbon and asbestos, a novelty lamp which can be used either for advertising purposes or as a television or bed lamp, a combined radio receiver and table lamp, and a telephone message recorder.

Recent industrial developments are shown in exhibits lent by the General Electric Co., Ltd. (cold pressure welding, layer thickness meter, magnetic sorting bridge and portable X-ray unit), A. C. Cossor, Ltd. (radar oscillograph), Electric & Musical Industries, Ltd. (dielectric heater) and British Watch Timers, Ltd. (visual watch timer). A spring flex-holder for irons, etc., is demonstrated by M. M. Sly in the commercial section.

The exhibition closes to-morrow (Saturday).

Wide Claims

IN the American magazine *Fortune* for February, 1953, the General Electric Company of America records " 75 Years of Electrical Progress " in a 16-page advertisement in colour and makes the following 63 claims:—

First Modern Watthour Meter with Magnetic Suspension.
First American Jet Engine.
First 70-mph Cold-Strip-Mill Drive.
First Mainline Electric Locomotive.
First Rayon Spinning Motor.
First 10,000-rpm Ship-Service Turbine-Generator.
First Unit Substation.
First Metal-Clad Switchgear with Flame-Retardant Insulation.
First Electronic Printing-Press Drive.
First Packaged Heat Pump.
First Switchgear Development Laboratory.
First Forced-Oil-Cooled Station Transformer with Directed Flow.
First Single-Phase Capacitor Motor.
First High-Performance Yaw Damper for Autopilot.
First Reheat Turbine-Generator.
First Nonflammable Liquid Dielectric.
First Gas Turbine-Generator in Commercial Service.
First Hot-Strip X-Ray Thickness Gage.
First Successful Diesel-Electric Locomotive.
First Aircraft Turbosupercharger.
First 300,000-hp Wind-Tunnel Drive.
First Variable-Voltage Shovel Drive.
First Motor with Cast-Aluminium Rotor.
First Triple Automatic Extraction Turbine.
First Turbine Generator with Oriented-Grain Strip Steel Laminations.
First Fluorescent Street Light.
First High-Voltage High-Interrupting-Capacity Controller.
First Distribution Transformer with Oriented-Grain Steel.
First Direct-Current Drive for Runout Tables and Coilers.
First Hermetically Sealed Refrigerator Motor.
First Large Steam Turbine for Power Generation.
First High-Output Aircraft Generator.
First Amplidyne.
First Expulsion-Type Fuse.
First Motor for Food Waste Disposer.
First Adjustable-Voltage Drive for Blooming-Mill Auxiliaries.
First Hydrogen-Cooled Synchronous Machine.
First Commercial Recording Spectrophotometer.
First Sectional Drive for Paper Machines.
First Cast-in-Concrete Reactor.
First Germanium Industrial Rectifier.
First Metal-Sheathed Electric Heater.
First Enclosed ac Magnet Motor Starter.
First Fluorescent Lamp Ballast.
First Gas Turbine Electric Locomotive.
First Turbine-Electric Ship Drive.
First Precision Remote Control for Aircraft Armament.
First Totally Enclosed Fan-Cooled Motor.
First Electronic Adjustable-Speed Drive.
First High-Voltage Laboratory to Record Microsecond Lightning.
First Step Voltage Regulator.
First Electric Furnace.
First Electric Car-Dumper Drive.
First Continuous Hot-Strip-Mill Drive.
First Electric Log-Carriage Drive.
First Precision Lead-Computing Gyro Gunsight.
First Modern-Type Load-Radio-Control.
First Double-Reduction Geared-Turbine Ship Drive.
First Power Capacitor.
First 330-kv, 15-million-kva Circuit Breaker.
First Electric Typewriter Motor.
First Butyl-Molded Instrument Transformer.
First Precision Gun Control.

What will the Russians (not to mention others) say to all this?

Standards and Codes

THERE have recently been issued by the British Standards Institution 2G. 121 (price 2s 6d) which specifies the requirements for hand operated circuit breakers for extra-low-voltage (24 V nominal) d.c. systems used in aircraft: also G. 142 (price 2s) for heavy duty electromagnetically operated single-pole breakers with contacts rated at not less than 50 A for similar circuits.

B.S. 1376 (price 4s) concerns the colours of light signals and is an attempt to reconcile discrepancies which exist in differentiation between colours set out in B.S. 505 (road traffic control), 563 (aerodromes), 623 (railways) and 942 (searchlight beams). This document replaces the 1947 edition and is in three parts, the last dealing with methods of testing for compliance with the requirements of the first and second parts.

Joint B.S.I./I.E.E. Code of Practice CO (ELE) 6125 has been circulated in draft form for technical comment, additional copies being obtainable for 2s each. This Code, which may eventually supersede CO (ELE) 4784, is intended to be a guide to those concerned with the abatement of radio interference, particularly installers and users of appliances which are liable to cause such interference. Requirements for manufacturers of components used in the devices described will be included in a revision of B.S. 613 now in preparation.

A draft form of CO (MEE) 8926 has also been circulated for technical comment, which must be submitted before 12th March. It is concerned with the series of standardized numbers known internationally as "preferred numbers" which are being increasingly employed in the preparation of standards and in the devising of ranges of products and processes. The technical features, advantages and uses of these numbers are discussed fully in B.S. 1638 : 1950 and the present draft has been prepared solely for the purpose of making available data on the numbers themselves to those who are familiar with their uses.

A revision of B.S. 799, "Oil burning equipment," price 10s, has been issued. The original document, published in 1938, was confined to fully automatic oil burning equipment for central heating and hot water supply suitable for fuel oils conforming to Grades A and B of B.S. 742, "Fuel oils for burners." The Standard has now been extended to include semi-automatic and hand-controlled equipment suitable for petroleum oils, Grades A, B and G of B.S. 742 and coal tar liquid fuels to B.S. 1469. It applies to oil burning equipment for boilers, heaters, furnaces, ovens and other similar plant, but it does not apply to marine mobile installations.

Full descriptions are given of items of equipment required (without sizes), including particulars of storage tanks, fittings, oil pipe lines, etc.

Radio Telephone Link

A NEW radio telephone link between Turkey, Western Europe and the U.S.A. was opened to public service on 16th February. The system has been designed, supplied and installed by Standard Telephones & Cables, Ltd., in collaboration with the Turkish Posts and Telegraphs Administration. It embodies the most modern systems of radio telephone operation of the kind in use by the British Post Office, and is much in advance of many of the existing long distance radio telephone equipments in use in other countries.

The equipment allows one or two telephone channels to be used simultaneously but is so planned that by making relatively small additions, this number can be substantially increased as the traffic grows. Telephone conversations over the new link are made private by a system which scrambles the speech before transmission, and unscrambles it at the receiving end. This scrambler system is of the same type as that used on the world's major links, including those between Europe and the U.S.A., and will interwork with the apparatus at these places.

To house the equipment for this service major radio stations have been erected by the Turkish P. & T. on specially chosen sites connected by armoured underground cables to the central office in Ankara, where operators control the circuits and ensure efficient linkage into the public telephone network of Turkey under the varying conditions of radio propagation.

In addition to the radio telephone service, the new stations considerably add to the long distance radio telegraph facilities of the Turkish Republic, not only by adding to the existing service from Istanbul, but also by introducing direct circuits from the capital city of Ankara. The new telegraph facilities provide for the first time in Turkey a radio teleprinter service, and this method of transmission of messages is rapidly replacing the older morse system.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Mr. Henderson Stewart, Secretary of State for Scotland, told Mr. Nabarro that he was informed by the North of Scotland Hydro-Electric Board that the average load factor during the twelve months ended 31st December, 1952, of all hydro-electric works owned by the Board was 27·7 per cent including Sloy, which was designed as a peak-load station, or 36·4 per cent excluding Sloy.

The total issued capital of the Board at 31st December, 1952, was £62 million, of which £57 million of stock had been issued to the National Debt Commissioners while £5 million of stock was a public issue.

The Board informed him that its total expenditure at 31st December, 1952, on generation works, including hydro, steam and diesel generating stations, main transmission, works acquired at vesting date and works under construction, was £62 million, and the aggregate installed capacity at that date was 560 MW. In addition, expenditure on distribution works amounted to £19 million.

Tax on Fluorescent Lamps

Mr. McAdden asked the Chancellor of the Exchequer whether he would give consideration to a reduction in the rate of tax levied on fluorescent lighting equipment.

Mr. Butler said that this suggestion was already under consideration, but he could not anticipate his Budget statement.

Indian Five-Year Plan

UNDER a five-year plan recently presented to the Indian Parliament, agriculture, including irrigation and power, has precedence over all other forms of development, though generation of electric power has also a high priority in its own right. According to the plan, the multi-purpose projects already under construction are expected to cost Rs765 crores (£574 million).

Up to the end of 1951 an expenditure of Rs153 crores (£115 million) had been incurred on these projects and during the five years covered by the plan (1951–56) it is expected that Rs558 crores (£418 million) will be spent. An additional 8·5 million acres will be irrigated and 1,032 MW of power plant installed as a result of the five-year plan and ultimately these totals will be raised to 16·9 million and 1,465 MW.

A sum of Rs40 crores (£30 million) has furthermore been provided for new schemes the total estimated cost of which will be well over Rs200 crores (£150 million). These include the Kosi project, stage 1, in Bihar and Nepal, which will irrigate 2·6 million acres, provide flood control, and allow for the installation of 40 MW of plant; Koyna, stage 1, in Bombay, 240 MW; Krishna, in Madras and Hyderabad, scope not given; Chambal, stage 1, in Madhya Bharat and Rajasthan, 1·2 million acres and 80 MW; and Rihand, in Uttar Pradesh, 240 MW.

"Vibrosonic" Washing

LAST week we had the opportunity of seeing, at the showrooms of Brown Bros., Ltd., Great Eastern Street, London, E.C.2, a demonstration of washing by the "Bosch" vibrosonic device which is designed for use in existing containers, such as wash-boilers, tubs and sinks.

The washer, which can handle up to 25 lb of laundry at a time, consists of an electrically vibrated diaphragm on a central rod, detachable rubber cross bars which fit into an adjustable cross member, a rubber connecting handle and a control switch and fused transformer.

The diaphragm is actuated by an armature and magnet of special design and is so shaped as to vibrate at frequencies varying from 100 to 5,000 a second. In operation the waves travel from the diaphragm to the limits of the container and back through the clothes for the whole period of the wash. The transformer has alternative outputs at either 40 V or 28 V governed by a control switch in the lead. Normal operating voltage is 28 V which gives a longer and quieter wash (30 minutes) than 40 V (10 minutes).

The apparatus is available for all standard a.c. mains supplies and it is claimed that it causes no interference. Of German manufacture, the "Bosch" vibrosonic washer is guaranteed for twelve months and is obtainable from Brown Bros. Ltd., at £21 10s 6d (including £6 19s 10d purchase tax in the United Kingdom) complete with transformer, etc.

"Bosch" vibrosonic washer

Dangerous Machinery

Replacement of Worn Parts

By F. E. SUGDEN

IN a recent appeal from a decision of Mr. Justice Parker in a case which was tried in the Queen's Bench Division of the High Court, the main question was whether an electrical manufacturing concern was negligent in carrying out the Woodworking Machinery Regulations, 1922. These regulations call for suitable guards for circular saws of different dimensions, having due regard to the fact that these saws usually become smaller and smaller as they are sharpened.

Mr. Justice Parker held that there had been no breach of regulations by the defendants, and as a consequence the action of the plaintiff for compensation must fail. There had been no negligence on the defendants' part. The plaintiff not being satisfied with this decision went to the Court of Appeal which, as will be seen later, upheld the judge's decision.

The case referred to is *Watson* v. *British Thomson-Houston Co., Ltd.* Briefly the facts were these, a circular saw was bought with a 24in diameter blade. With use the diameter of the blade was gradually reduced by the continual sharpening of the tips and re-gulleting (cutting deeper by filing) of the teeth. Owing to market conditions a new blade ordered in February, 1948, was not received until April, 1950, and in consequence, by March, 1950, the diameter of the old blade had been reduced to 19½in, compared with the 24in diameter arc of the riving knife used to fence it. The distance of the front edge of the riving knife from the teeth of the saw at table bench level was under half an inch in accordance with the requirements of Regulation 10 (b) (ii) of the Woodworking Machinery Regulations, 1922, but, owing to the different diameters, the clearance horizontally 4⅜in above the table, where the knife met the guard covering the top of the saw, was 1⅛ to 1¼in. On 13th March, 1950, while the plaintiff was removing a piece of wood jammed in the machine, his fingers were caught in the saw and he was injured.

It is interesting to note at this stage that the Woodworking Machinery Regulations, 1922, referred to above, provide that every circular saw shall be fenced as follows:—

(b) Behind and in direct line with the saw there shall be a riving knife, which shall have a smooth surface, shall be strong, rigid, and easily adjustable, and shall also conform to the following conditions: (i) The edge of the knife nearer the saw shall form an arc having a radius not exceeding the radius of the largest saw used on the bench.

The Court held that Regulation 10 (b) (i), contemplating as it did that the bench might be used for saws of different sizes, was complied with so long as the radius of the arc formed by the riving knife did not exceed the radius of the largest saw used on the bench. In the present case, the largest saw used was of 24in diameter and it did not cease to be the largest saw within the meaning of the regulation merely because for a time it became of less diameter; and therefore there had been no breach of the regulation.

It is thus seen that where parts of machinery become worn through use or other causes and all possible steps have been taken to replace them, that is, to a very great extent, a good defence to an action for damages for negligence. It thus behoves a manufacturer, or contractor, if he is using "dangerous" machinery, to order replacements of worn machine parts as quickly as possible. But if, through general conditions of trade, the parts are not delivered immediately, the contractor is covered legally if he can show he has taken all reasonable steps to make the replacements. Of course, if a machine becomes extremely dangerous the contractor is strongly advised to cease using it until the replacements have been made.

Power Station Construction

Use of Precast Concrete at Acton Lane

IN a paper read at the 24th February meeting of the Works Construction Division of the Institution of Civil Engineers Messrs. J. A. Derrington and A. G. S. Lance referred to the Acton Lane "B" generating station which had been planned to replace existing plant and would, when completed, house six 30 MW, 6 kV steam turbo-alternators (see *Electrical Review*, 18th January, 1952, p. 106).

The turbine house and switch annexe of the first half of the structure were constructed with a reinforced concrete frame, precast on the site, and the boiler house section, with a steelwork frame, was now being erected. The precast elements of the turbine house were large and were so arranged that they could be lifted into position from their casting place by two 35 ton travelling derricks. The joints were designed so that with steel reinforcing bars lapped and concrete infilling cast the structure would act as though monolithic.

The main turbine house roof beams were 65ft long and weighed 27 tons each; the supporting columns were 66ft long and weighed 33 tons each; and the roof slabs were cast in panels 26ft long, 8ft wide, weighing 12 tons each. The switch annexe contained four storeys, and all columns and main and secondary beams were precast with connections arranged so that all units could be erected without the use of props or other temporary supports. The floor and roof slabs were then cast *in situ*, tying the structure together and distributing the horizontal forces throughout the building. Brick panel walls across the switch annexe resisted the lateral forces produced. The design was based on British Standard Code of Practice C.P. 114 (1948).

Special lifting devices were designed for raising each unit and fixing it in place and in some cases the design of a member was adapted to suit stresses which would only occur during erection.

Concrete was batched by weight and distributed to the casting yard in the basement by a concrete pump. The precasting and erection were completed in approximately six months from the placing of the order, well before the erection of the steel structure had commenced. As each unit was adjusted to within $\frac{1}{8}$in of its true position, both at ground level and at roof level 60ft above, it was found that a high degree of control was needed in erecting units. A workshops and stores block 75ft by 105ft was constructed in a similar way adjacent to the main building.

The Acton Lane turbine house was described by the authors as a good example of several buildings which had been constructed by the use of the same methods, showing many advantages over the usual steelwork frame, including economies in initial cost and maintenance and great savings in steel and skilled labour.

New Fan Test Code

IT has been felt in the fan engineering industry for some years that the British Standards Code for the testing of fans for general purposes (B.S. 848 : 1939) has become inadequate. Accordingly, following deliberations and experimental work extending over a period of five and a half years, a technical committee appointed by the Fan Manufacturers' Association has prepared a performance test code conforming to modern thought and practice which, it is hoped, will be universally accepted and adopted by the fan industry and fan users as the standard test code.

The new code retains much of the structure of B.S. 848 but is more precise and more comprehensive in its presentation of test data and new test methods have been substituted, primarily for the testing of axial and very small fans. The scope of the code has been widened, as the test methods adopted are suitable for testing fans where the pressure rise exceeds 1 lb/sq in and corrections for compressibility are included for pressure rises up to 200in water column. The symbols and formulæ have also been revised and extended. Copies of the code are obtainable from the Association, Copthall House, Copthall Avenue, London, E.C.2, price 9s 6d (postage 6d).

OVERSEAS ELECTRICAL TRADE

Exports of Electrical Machinery Improve in January

ALTHOUGH exports of electrical apparatus and machinery last month, at £15,802,223, were £676,293 higher in value than in December they were £851,342 below the comparable figure for January last year. The decline was mainly attributable to reduced purchases of the majority of items in the electrical goods and apparatus section as well as of such articles as washing machines, vacuum cleaners, portable tools and other portable appliances which are outside the main electrical machinery classification. In the last named category exports improved from £5,071,221 to £5,373,010.

With the opening of the new year's

TABLE I.—ELECTRICAL EXPORTS

Class	January, 1952	January, 1953
	£	£
Telegraph and telephone cables and wires (submarine)	60,234	12,171
Ditto, not submarine	541,496	644,599
Cables and wires, paper insulated	744,556	1,329,920
Ditto, rubber insulated	761,167	538,176
Ditto, cotton, silk or artificial silk insulated	70,021	109,978
Ditto, enamel, glass or asbestos insulated	85,986	101,641
Ditto, other	336,811	399,886
Commercial radio apparatus	556,256	806,658
Domestic radio apparatus	474,023	338,345
Telegraph, telephone and signalling apparatus	1,628,251	1,896,849
Loudspeakers and microphones	81,311	41,706
Radio, telecommunication and electronic apparatus components and parts, n.e.s.	578,762	421,594
Other radio, telecommunication and electronic apparatus	143,523	190,760
Cathode ray tubes	3,658	8,251
Other valves	319,088	161,659
Carbons	44,172	11,340
Lamps, exceeding 24 V	111,986	63,192
Ditto, not exceeding 24 V	58,659	20,013
Other lighting appliances	502,326	462,704
Primary batteries	213,571	167,858
Parts other than carbons	51,102	22,366
Accumulators for motor vehicles	293,009	145,168
Ditto, traction	44,556	12,201
Ditto, radio	2,561	2,774
Other portable accumulators	58,281	38,318
All other accumulators	15,632	51,693
Parts and accessories	81,778	65,144
Cooking appliances	312,188	89,856
Heating appliances	94,955	80,242
Parts and accessories for cooking and heating appliances	85,518	81,909*
Flat irons	51,153	37,062
Commercial electrical instruments	137,535	128,592
House service meters	149,543	95,063
Time recorders and time switches	11,394	16,382
Other electrical instruments	108,987	139,551
Electro-medical apparatus (not X-ray)	52,351	35,240
X-ray apparatus, other than tubes and valves	113,339	107,273
Vacuum tubes	92,867	73,047
Permanent magnets	31,664	36,293
Insulating cloth and tape	125,558	39,953
Other insulating materials	125,815	57,722
Unclassified electrical goods and apparatus	673,050	602,939
TOTAL, electrical goods and apparatus	10,065,062	9,689,388
Diesel driven generators, not exceeding 10 kW	441,383	94,501
Ditto, over 10 kW to 65 kW		125,336
Ditto, over 65 kW to 200 kW		115,525
Ditto, exceeding 200 kW	169,688	91,475
Other generating sets	305,453	170,038
Generators and parts of generators	616,872	1,184,900
Motors, railway, tramway and trolley-bus	6,134	31,461
Ditto, other, not over ½ h.p.	224,525	123,155
Ditto, over ½ h.p. but under 1 h.p.	83,106	39,564
Ditto, from 1 h.p. to 250 h.p.	569,151	470,080
Ditto, exceeding 250 h.p.	122,708	125,116
Ditto, parts	78,765	111,631
Converting machinery	6,454	20,584
Transformers, including coils	948,587	993,741
Mercury arc rectifiers	32,839	45,665
Motor starting and controlling gear	224,058	288,268
Switchgear and switchboards (not telegraph and telephone)	1,441,498	1,287,925
Electrical machinery, n.e.s.	*	54,042
TOTAL, electrical machinery	5,071,221	5,373,010
Washing machines (not exceeding 150 lb weight)*	699,778	162,194
Ditto (over 150 lb but not exceeding 250 lb weight)*		130,428
Ditto, parts	29,083	27,566
Vacuum cleaners	236,501	95,274
Ditto, parts	56,231	34,948
Other electrically operated portable appliances	366,477	165,032
Portable electric tools	129,212	124,383
GRAND TOTAL	16,653,565	15,802,223

* Not separately distinguished in 1952.

accounts the opportunity has been taken to extend and modify a number of the classifications. In Table I the most noteworthy change is the splitting up of the classification for diesel driven generators not exceeding 200 kW into three, and washing machines are now shown in two groups. Cathode-ray tubes are now shown separately from other types of valves, and similarly X-ray tubes are segregated from X-ray apparatus as a whole. "Rectifiers for power house use" has been replaced by "Mercury arc rectifiers," and the residual item "Electrical machinery not elsewhere specified" has been transferred from the end of the Machinery Group to a more appropriate position in the electrical machinery section.

Table II.—Distribution of Electrical Goods and Apparatus

Destination	January, 1952	January, 1953
	£	£
Channel Islands	33,595	44,543
Gibraltar	6,219	13,615
Malta and Gozo	16,515	11,511
Cyprus	12,970	33,459
Gold Coast	69,891	66,129
Nigeria	156,629	115,049
Union of South Africa	773,739	1,334,053
Northern Rhodesia	61,137	72,725
Southern Rhodesia	137,587	148,113
British East Africa	165,447	305,342
Bahrein, Qatar and Trucial Oman	32,383	88,832
Kuwait	38,816	49,247
India	850,584	1,055,890
Pakistan	221,937	212,594
Malaya	426,365	472,534
Ceylon	159,612	136,604
Hong Kong	225,330	208,003
Australia	1,282,089	837,118
New Zealand	701,015	165,187
Canada	253,212	231,353
British West Indies	138,313	114,172
Anglo-Egyptian Sudan	77,221	86,107
Other Commonwealth Countries	175,184	263,179
Irish Republic	369,667	326,858
Soviet Union	18,176	5,496
Finland	123,779	74,114
Sweden	328,673	180,373
Norway	175,768	137,499
Iceland	25,237	97
Denmark	81,656	49,849
Poland	46,608	19,797
Western Germany	52,646	68,651
Netherlands	281,975	227,490
Belgium	159,417	190,168
France	115,246	140,008
Switzerland	54,585	36,771
Portugal	121,679	78,786
Spain	28,714	74,569
Italy	84,049	175,770
Austria	53,141	45,636
Czechoslovakia	15,016	11,527
Yugoslavia	83,643	20,657
Greece	111,251	59,589
Turkey	162,697	201,643
Portuguese East Africa	13,308	16,257
Syria	9,124	10,360
Lebanon	32,650	29,046
Israel	62,593	9,859
Egypt	165,668	152,550
Arabia	40,602	18,112
Iraq	93,645	155,459
Iran	22,215	22,933
Burma	85,075	52,050
Thailand	23,287	55,649
Indonesia	58,517	48,823
China	14,575	924
United States of America	84,227	105,295
Colombia	127,142	17,863
Venezuela	90,955	83,043
Peru	25,330	13,775
Chile	56,790	29,103
Brazil	112,293	72,490
Uruguay	26,674	2,588
Argentine Republic	155,853	8,146
Other Foreign Countries	251,533	294,056
Total	10,065,062	9,689,388

Details of the destinations of exports of electrical goods and apparatus as a whole are given in Table II. Among individual items, over one-third of the telegraph and telephone cables and wire (not submarine) was sent to South Africa (£129,571) and New Zealand (£104,162), while India (£382,802), Australia (£267,035) and Malaya (£104,725) between them accounted for over a half of the paper insulated types. India was the best market for both smaller insulated (£76,020) and other cables and wires (£137,806).

Overseas sales of commercial radio apparatus, the value of which rose from £556,256 to £806,658, were widely distributed throughout the world, with no exceptionally large buyers. South Africa was the biggest purchaser of domestic radio sets (£62,672) and also telegraph and telephone equipment (£609,627), the next best markets for the latter apparatus being Australia (£165,264), New Zealand (£146,573) and Malaya (£123,740).

Of the £462,704 worth of lighting appliances other than lamps sold India took £65,220 and South Africa £53,953, the latter country also being the biggest buyer of accumulators (£26,251) and electric cooking and heating appliances (£36,920). India (£42,803), South Africa (£38,178) and Australia (£32,890) headed the list of purchasers of electrical instruments.

Electrical Imports

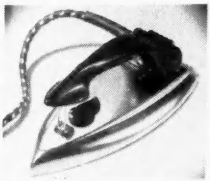
The Netherlands supplied £173,375 of the £504,591 worth of electrical goods and apparatus imported, which showed a decline of £103,920 compared with January last year and included £164,371 worth of radio, telecommunication and electronic apparatus and £93,672 worth of valves. Imports of electrical machinery comprised generators valued at £50,408 (£48,061) motors £63,518 (£46,928) and "all other sorts" £84,803 (£18,426).

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Automatic Travel Iron

THE latest electric iron announced by MORPHY-RICHARDS, LTD., 121, Victoria Street, London, S.W.1, is a lightweight model for travellers. Besides thermostatic heat control, it has an automatic voltage selector and can be used on any a.c. or d.c. mains from 100 to 250 V. The chromiumplated steel soleplate is almost as large as that of the normal domestic iron, but the weight is only 1¾ lb. Folded flat for packing, the dimensions are 7¾in by 4in by 2⅝in high, the handle stay and heel rest forming clips around which the lead is wound. The nominal rating is 375 W. This iron (model GW/1) is priced at 55s. It may also be obtained for single voltage ranges (100 to 140 V or 200 to 250 V) as GV/1, price 45s.



Morphy-Richards lightweight travel iron

Coronation Lighting Set

An inexpensive Coronation lighting set for use in shops or homes is available from the BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, London, W.C.2, in the form of a crown in colour studded with red, white and blue "Mazda" lamps. The set is wired ready for use on normal mains voltages and costs 26s 3d including purchase tax.

Yellow Headlamp Bulbs

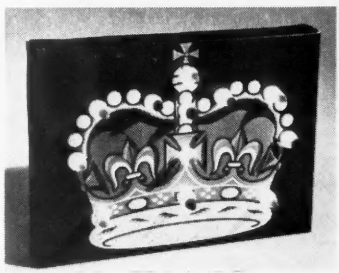
As many motorists prefer a yellow-glass headlamp bulb for driving in fog or mist the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has re-introduced its range of single and double filament "Osram" bulbs, using cadmium-yellow glass, both for ordinary and for British pre-focus headlamps. These bulbs cost 1s 3d more than the corresponding types of clear bulbs.

Adjustable Fluorescent Reflector

The "Spotline" adjustable fluorescent reflector made by LINOLITE, LTD., 118, Baker Street, London, W.1, is available for use with 18in 15 W, 2ft 20 W or 4ft 40 W fluorescent tubes and is supplied ready wired for connecting to control gear. It is made from stout gauge aluminium with an anodized reflecting surface and provides a 20 deg cut-off. The adjustment brackets are constructed from tubular steel. A combined base and control gear housing is also available for use with the two smaller fittings and this can also be used as a separate unit with the 4ft fitting.

"Spotline" adjustable fluorescent reflector

B.T.H. Coronation lighting set



Electrical Commercial Travellers

Association's Annual Luncheon

THERE were over 500 members and guests at the annual luncheon of the Electrical Trades' Commercial Travellers' Association which was held on Friday last at the Connaught Rooms, London. Mr. A. E. Iliffe (president) was in the chair.

As is customary at this function the speeches were opened by an appeal by Mr. S. Johnson, the charity steward, who said that in the past year the Association had contributed 350 guineas to the Electrical Industries Benevolent Association and 225 guineas to the Royal Commercial Travellers' Schools, in addition to supporting its own benevolent fund.

Sir Ernest Cooper, who was to have proposed the toast of the Association, was unable to attend, and Mr. V. W. Dale, general manager and secretary of the British Electrical Development Association, stepped into the breach.

In congratulating the Association on making charity one of its principal activities, Mr. Dale said that it had contributed £12,000 to the E.I.B.A. and the Commercial Travellers' Schools since its formation, and had done much to ease the lot of many in the electrical industry. Speaking of future development, he said that in his opinion we were further away from saturation point than we were forty-five years ago. But for the war nearly half of the housewives of this country would now be cooking by electricity. The E.T.C.T.A. now had over 600 members.

Mr. Iliffe, in replying to the toast, spoke of the importance of cheerfulness in salesmanship, and referred to the usefulness of the Association in providing opportunities for the interchange of thought and ideas. He asked members to make a note of the Coronation ball which would be held on 2nd October next.

The toast of the guests was proposed by Mr. D. G. E. Barrie to which Mr. E. Mead responded. The toast of the chairman was proposed in felicitous terms by Mr. A. Watson, and Mr. F. N. Woods, in replying, referred to the changes which had taken place in the electrical industry since he entered it fifty years ago. He urged the younger members to avail themselves of the facilities afforded by technical schools and other educational institutions so that they could take advantage of any changes which might occur in the future. He announced that a collection taken during the luncheon for the Association's charities amounted to £115.

Mr. F. N. Woods (chairman), Mr. V. W. Dale (E.D.A.) and Mr. A. E. Iliffe (president) at the annual luncheon of the Electrical Trades' Commercial Travellers' Association

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Electric Spark Study

UNDERSTANDING of the nature of spark breakdown in gases has developed mainly from experiments with short sparks of the order of 1 cm long. At the present time a fairly detailed account of such a spark can be given. In a paper which was presented at a meeting of the London Students' Section of the Institution of Electrical Engineers on Tuesday last, Dr. E. H. Cohen (Metropolitan-Vickers Electrical Co., Ltd.) described the fundamental processes operative in longer sparks, where, especially in the case of the lightning stroke, a complete picture cannot yet be given with confidence. The author discussed the two main theories of short spark breakdown, the Townsend theory and the Streamer theory, with emphasis on their historical development.

Brazilian Trade Facilitated

Free Exchange Market

From Our Rio Correspondent

THE much-debated Bill recognizing the free exchange market was approved by the Brazilian Congress on 15th December and sanctioned by President Vargas on 7th January. It came into force on 21st February.

The official exchange rate (18·72 cruzeiros to U.S. $1.00 and 52·41 to £1) is reserved for imports and exports of merchandise and co-related services, namely freights, insurance and banking services; Government services; foreign loans and remittances of interest and profits on foreign capital of special importance to the national economy. All other operations will be at rates freely agreed between the parties. Certain high-priced Brazilian products which during the last three years have represented less than 4 per cent of the total annual value of Brazil's exports, and those products which had been acquired by the Government before the coming into force of the new law, may also be exported at the free rate of exchange, provided they cannot be sold abroad at the official rate. Imports of non-essential merchandise, formerly imported under barter deals, which are henceforth prohibited, may be paid for at the free rate.

It will be noted that the new law facilitates the entry of foreign capital and the transfer of interest and profits, which may be remitted without restriction at the free rate. It also relieves the exchange derived from exports from the heavy burden of non-commercial payments and permits the exportation of products which are unable to compete in international markets at the official rate.

The effect should be to increase the exchange available for imports. The measure is, in fact, similar to that adopted by Brazil to liquidate her commercial debts in the 1930s.

During the first eight months of 1952 Brazil imported electrical machinery and apparatus valued at £31,489,000 and imports will continue at a high level during the next five years, until completion of the electrification programme. Although Brazil ranks fourth in the world as to power resources, officially estimated at 19,519,300 h.p., its *per capita* consumption is at present one of the smallest. The output of electrical energy still falls far short of the country's needs, but considerable progress has been made in recent years. Plant capacity increased from 1,243,877 kW in 1940 to 1,696,563 kW in 1949 and is expected to reach 2,713,924 kW this year. Hydro-electric power, which began to be developed after 1900, now represents two-thirds of the total available. Sao Paulo ranks first in installed capacity, followed by the Federal District, Minas Geraes and Rio Grande do Sul, in that order. Of the total potential h.p. 49·8 per cent is in Parana and 22·5 per cent in Amazonas, the State in which it is least utilized.

Development Projects

President Vargas has approved further electrification projects, recommended by the Brazil – United States Commission, namely to electrify a section of the Rede Mineira Railway; and to build a 9,000 kW hydro-electric station at Mimosa, Mato Grosso, and to increase the power of the station at Corumba, the state capital. These will involve loans by the World Bank to purchase foreign exchange and cover the cost of imports. This brings the total number of approved projects to raise installed capacity to seven.

In December Rio Grande do Sul was authorized to obtain a loan of U.S. $25 million from the World Bank to finance imports of equipment for the State electrification programme. Plans are now being drawn up for a 30,000 kW station on the Camaquan River, not previously included in the above programme. It will supply electricity to the southern part of the State.

Representatives of the French Schneider group recently visited Bahia to study the project for the State's first central hydro-electric station, to be built at the Fechoydo Funil Falls, on the lower reaches of the Rio das Contas (see *Electrical Review*, 1st June, 1951).

The Sao Francisco Valley Commission has signed a contract with Odebrecht, Ltd., for a station at the Rio Corrente Falls, in Bahia (*Electrical Review*, 5th September, 1952). This station forms part of the programme for the economic development of the Valley, approved in October, 1951. Plans include a dam at Tres Marias, on the Upper Sao Francisco; three dams on the Rio das Velhas and a reservoir at Boqueirao on the Rio Grande; utilization of the hydraulic power of the Abaete and Funil Falls; a reservoir at Cajura; and central stations at Pandeiros, Jequiti and Formosa-Correntes. A contract has been signed for building the dam on the Upper Sao Francisco, to store 15,000 million cu m of water and increase the capacity of the Paulo Alfonso station by 50 per cent during prolonged dry seasons.

Manufacturing Industry

The Federal Commission for Industrial Development, appointed in August, 1951, received during 1952 over a hundred proposals to organize or extend manufacturing activities in Brazil. A large proportion of these were from firms established in North America and Europe. With a view to facilitating its work the Commission has set up a number of sub-committees to deal with the various branches of industry. A list of preferential activities has been drawn up and priority is to be given to proposals to increase installed capacity and to manufacture motors and heavy electrical materials. In December President Vargas signed a decree establishing measures to encourage the local manufacture of heavy materials and turbines. Companies organized for this purpose will be entitled to Government loans and will enjoy priority for the remittance of profits and return of capital. As local production increases, imports of similar materials from abroad will be restricted and all State departments, as well as public service corporations, must place their orders as far as possible with local manufacturers. The entry of specialized workers from abroad will be facilitated and manufacturers will receive preferential treatment to import the raw materials and equipment required to install and maintain their services, and will be entitled to any other concessions granted by law to industries of national interest.

At least one old-established British firm is expected to collaborate in establishing a new industry.

Midlands Building Exhibition

MANY electrical aids to building construction are to be seen at the Midlands Building Exhibition, which until to-morrow is being held at Bingley Hall, Birmingham. A wide range of electric tools for wood and metal is demonstrated on the Buck & Hickman stand, Burnard & Co. (Tools), Ltd., also showing various machine and hand tools, together with other industrial electrical equipment, "Rawlplugs," etc. The "Circulex" portable electrically-operated 14in saw bench, which can easily be carried by sedan chair type handles, is a particularly useful piece of equipment shown by Armand Dutry & Co. (Adeco), Ltd. With a 5in depth of cut it will do practically all the woodwork needed on a building site and, with abrasive wheels fitted, will cut asbestos, tiles, brick, slates and even sheet metal. Dust extractors can be fitted if desired. A special moulding block is available and the protruding spindle takes a drill chuck, grinding and buffing wheels, etc.

The new "Baxtul" stonemason's chiselling machine accompanies concrete vibrators on the Flexible Drive & Tool Co.'s stand, and both the "Rapid Hammer" bolt driving guns and the "Rapid Mate," which is able to chase channels in breeze and brickwork and drill holes from ¾in to 6in in diameter, are demonstrated by Adam & Harvey (Rapid Hammer), Ltd. Various woodworking machines are shown by the Midland Saw & Tool Co., Ltd., and the Kine Engineering Co., Ltd. Hilmor, Ltd., has a comprehensive range of tube-bending machines on view.

The Industrial Fan & Heater Co., Ltd., specializes in fans and ventilating equipment, including dust and fume extraction plants, plenum heating and cooling plants. A good selection of the latest domestic appliances can be inspected on the Hadley Bros. (Radio & Electric) stand, and a Hoover washer, built into a sink unit, is shown by Barrow's Stores, Ltd.

COMMERCE and INDUSTRY

Transformers and Rating Valuation

Specification for Heater Guards

AT Folkestone Valuation Court, Banks & Son, house agents, recently appealed for a reduction in the assessment of a local house on the grounds that two transformers constituted a nuisance and a loss of amenity, causing a depreciation in the value of houses in the neighbourhood. Mr. P. R. Bean, F.R.I.C.S., for the appellants, said that the appeal was in the nature of a test case and it was hoped that when agreement was reached other assessments in the district would be inquired into.

It was stated that a substation was erected in the area in 1934 and subsequently increases in equipment were made. In 1950 two very large transformers were erected, not to meet local needs as the original substation, but to serve a large area which included Ashford, Dover and Canterbury. There had been a considerable number of additions since 1950. Since then there had been much complaint about the noise caused, and inquiries had been held. The transformers had been shut off at night, and screened. After that a 26ft wall was built and a promise was made that the noise would be decreased to one-sixth. Tests had been made which showed that there was a perpetual hum, varying according to the direction of the wind and the load carried. Mr. Bean also claimed that the transformers blocked out the view. The occupier of the house stated that sleep was impossible unless all windows were shut.

The Panel reduced the gross assessment from £36 to £34, with rateable value from £27 to £25.

Guards for Heaters

In anticipation of the regulations to be issued by the Home Office under the terms of the Heating Appliances (Fireguards) Act, 1952, the British Standards Institution has published B.S. 1945 : 1953 which brings together (with modifications) three previous specifications covering the protection of gas, electric and oil-burning heating appliances.

The new publication specifies guards for all types of heaters, whether portable or fixed, used for domestic purposes and the like and having heating elements, exposed flames or radiants of such a nature, or so placed, that there is a risk of fire or injury. A scorching test is included. In this a piece of flannelette of specified quality is placed in contact with the guard and it must not smoulder or ignite within a specified time. Tests of the mechanical strength of the guard and the inaccessibility of the elements are also included.

Copies of this Standard may be obtained from the Institution's Sales Branch, 24, Victoria Street, London, S.W.1, price 2s.

Blackwall Tunnel Lighting

In October, 1949, the London County Council approved an estimate of £30,000 for the installation of fluorescent lighting in Blackwall Tunnel, intending that the new system should be installed section by section. It is reported that the installation in the northern section and northern approach is now almost complete and is a great improvement on the old system of lighting. The estimated cost of the next section, namely the southern section as far as No. 4 shaft, including the southern approach, is £8,500, of which about £3,500 is likely to be incurred in the current financial year and the balance in 1953–54. As for the northern section, the installation of wiring, conduit and accessories is to be carried out by direct labour and the supply, laying and jointing of cables, the erection of a switchroom and other building works by contract.

British Furniture Exhibition

Apart from including a large number of modern lighting fittings of all types the British Furniture Exhibition, which is being held at Earls Court, London, until next Friday, contains a considerable amount of electrical machinery designed specifically for the furniture manufacturing industry. A table lamp with a body in the form of a crown is a special Coronation item among the comprehensive display of lighting fittings by the New Era Shade Co., while some novel adjustable standard lamps constructed of light metal rods with counterbalances, made by H. C. Hiscock, are to be seen on the stand of J. Cinnamon, Ltd. Other interesting modern designs are shown by W. J. Lamkin, Ltd., W. G. Evans & Sons, Ltd., George Harris & Bros. (Furniture), Ltd., Kostick Bros., and Beresford & Hicks. Bureaux with built-in striplights are now made by Emkay Furniture Products, Ltd., and J. H. Hunt & Co. (High Wycombe), Ltd., supply illuminated pictures.

Special veneer and plywood machinery are

demonstrated by both H. Schubert, Ltd., and Interwood, Ltd., the latter also showing high-speed routers, automatic saw sharpeners, sanders, dowel machines, etc. A new oscillating belt sanding machine is introduced by Rye Machinery Sales (High Wycombe), Ltd., together with a single-end turning machine and a double-sided mortising machine. A single-pad sander is among a range of machines exhibited by Sundstrand Sanders, Ltd.

Lead and Copper in 1952

Figures published by the British Bureau of Non-Ferrous Metal Statistics show that the total consumption of lead in the United Kingdom during 1952 was 293,320 tons, of which the cable making industry used 108,677 tons (37·1 per cent) and battery makers 26,713 tons (9·1), plus oxides and compounds 21,038 tons (7·2 per cent).

In 1952 the output of copper wire was 192,299 tons (against 172,182 tons in 1951) and that of alloyed copper wire 16,541 tons (17,432 tons). The corresponding figures for rods, bars and sections were 14,020 tons (13,545 tons) and 126,825 tons (129,480 tons). For sheet, strip and plate the outputs were 53,894 tons (61,019 tons) and 130,476 tons (127,865 tons).

Falk's Southampton Showrooms

In our last issue we reported the opening of the new branch depot in Southampton of Falk, Stadelmann & Co., Ltd. In the accompanying picture we show the commercial and industrial lighting section of the showrooms.

A section of the new showrooms at the Southampton depot of Falk, Stadelmann & Co., Ltd.

Australian Restrictions Relaxed

Brief reference was made in our last issue to the decision of the Australian Government to relax its restrictions upon imports from the sterling area. The original order classed imports in three categories—" A," " B " and " Admin.," the last-named including goods which did not lend themselves to quota treatment. Imports of goods in Category " A " were restricted to 60 per cent of those in the base year 1st July, 1950, to 30th June, 1951. Electrical goods falling into this section include covered cable and wire, miners' safety lamps, parts of trolley-buses, etc., X-ray apparatus and accessories, " electro-surgical combination units for cutting, etc.," telephone and telegraph apparatus, magnetos, ignition coils, electrical fittings not containing metal, storage batteries and parts, condensers, watt-hour meters, etc. For the year beginning on 1st April the quotas permitted in this category are to be raised to 70 per cent.

An increase from 20 to 30 per cent is made in the case of Category " B " goods which include welded conduits, clothes washing machines, hydro extractors, refrigerating appliances, air compressors, cookers, kettles, toasters, irons, fans, radio apparatus, lamps, dry batteries, electrical fittings and accessories, etc., wall, stand or table lamps, etc.

Most power plant—boilers, turbines, generators, transformers, motors and switchgear—is included in the " Admin." category.

Electrical Engineers' Exhibition

The opening ceremony at the second Electrical Engineers' Exhibition at Earls Court, London, will be performed by Sir John Hacking, deputy chairman (operations) of the British Electricity Authority, at noon on 25th March from the stand of the Association of Supervising Electrical Engineers. He will be received by the Association's president, Mr. C. T. Melling, and the chairman, Mr. L. L. Emmett.

The Electrical Association for Women has agreed to assist the Association's Technical Committee to judge the entries for the domestic labour saving award; the industrial labour saving award will be made by the Technical Committee.

Gas Equipment Comparisons

The domestic electrical apparatus manufacturers should take it as a compliment that latest gas appliances follow so closely in appearance the designs of their electrical counterparts. At the " Gas in the Design for Living Exhibition " now being held at the Building Centre, Store Street, London, W.C.1, the gas equipment, in particular such items as cookers, reflector fires and convectors, is to a casual observer indistinguishable from similar electrical apparatus. Controls appear practically identical and the light colour schemes more generally associated

with electrical apparatus are commonplace. Such features as warming drawers, drop-down doors, etc., are also now widely adopted in cookers.

The exhibition also serves to indicate the extent to which even gas appliances are dependent on electricity for their operation. In the modern "gas" home, apart from the lighting which is invariably electric, electricity is called into service for, among other things, the gas lighter, the clock, the washing machine and the fan heater. A special display, applicable to both gas and electricity, stresses the advantages of lagging hot water installations.

"Thermodare" thermal storage heaters installed at the Irish Embassy

An English Electric Exhibit

The English Electric Co., Ltd., has found, too late for correction, that an incorrect number has been given for its stand at the Ideal Home Exhibition in an advertisement in this issue. The correct stand number is 245 (not 42).

Pumping Station Switchgear Renewal

At the London County Council's Abbey Mills pumping station, Stratford, where there are eight 600 h.p. electrically driven pumps, the electricity supply is brought in at 6,250 V from the mains of the London Electricity Board, and is controlled by a large main switchboard and a considerable quantity of auxiliary gear. The Council's Rivers and Drainage Committee reports that this switchgear is of an obsolete pattern, about 23 years old, and must shortly be replaced. Because of the large amount of work that must be done by the London Electricity Board, and also because of the necessity to keep as much of the plant as possible in service during the work of renewal, the Committee proposes that the supply and installation of the new gear shall be wholly carried out by the Board, which will be responsible for all cabling, alterations to foundations, erection, etc. The total estimated cost is not expected to exceed £20,000.

Heating of Irish Embassy

The heating of the whole of the new premises of the Irish Embassy at 17, Grosvenor Place, London, S.W.1, has recently been carried out with the aid of "Thermodare" thermal storage heaters supplied by the Aberdare Electric Co., Ltd., which has just opened offices in London at 36, Victoria Street, S.W.1. The basic feature of these heaters, a full description of which appeared on page 194 of our issue of 25th July last, is that the heat storage medium is a solid refractory material in which the elements are threaded through ducts, the whole being heat insulated and encased in sheet steel. About 160 of these heaters in single and double units, with a total loading of 228 kW, have been installed at the Irish Embassy.

Among many other installations of "Thermodare" equipment recently undertaken in the London area are those at the London Electricity Board's Victoria Street offices and Fulham central stores; the offices of Radio Luxembourg; Foster Wheeler, Ltd.; Freeman, Fox & Partners; Allen West & Co., Ltd.; British Engineering & Export Cpn., Ltd.; the National Coal Board (Hobart House); the Ministry of Works (Petty France); John Mowlem & Co., Ltd.; and Monsanto Chemicals, Ltd.

Technical Data Service

A technical data service for engineers engaged in the design of radio and industrial electronic apparatus has been introduced by the General Electric Co., Ltd. This service, which covers "Osram" valves, G.E.C. cathode-ray tubes, germanium crystals and associated electronic devices, consists of the distribution of technical data sheets as they are published.

The initial distribution comprises a loose-leaf binder and the complete series of data sheets issued up to the current date. All subsequent sheets will be forwarded to subscribers and the overall cost is 7s 6d. Additional binders cost 7s 6d each.

The information provided, which should satisfy the full needs of the designer, is published

in a standard form to permit quick reference. Application forms can be obtained from the Osram Valve and Electronics Dept., General Electric Co., Ltd., Kingsway, London, W.C.2.

A Booklet on B.E.A.M.A.

The British Electrical and Allied Manufacturers' Association, 36, Kingsway, London, W.C.2, has produced a booklet in which the Association's constitution and its activities during the past fifty years are briefly dealt with. It is a reprint of an earlier booklet but this time a full alphabetical list of members is included and their names are also given under the sections of the Association to which they belong.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £166 0s 0d
COPPER, H.C. Electro	ton £285 0s 0d
Fire Refined 99·70 per cent ..	ton £282 10s 0d
Fire Refined 99·50 per cent ..	ton £274 0s 0d
COPPER Tubes	lb 2s 8½d
Sheet	ton £338 10s 0d
H.C. wire and strip	ton £317 15s 0d
LEAD, English	ton £93 10s 0d
Foreign	ton £92 0s 0d
MERCURY	flask £70 10s 0d
TIN	ton £951 0s 0d
ZINC, G.O.B. Foreign	ton £88 0s 0d
Electrolytic	ton £92 0s 0d
BRASS Tubes	lb 2s 2d
Sheet	ton £267 15s 0d
Wire	lb 2s 7½d
PHOSPHOR BRONZE	
Wire	lb 4s 1½d
RUBBER, No. 1 R.S.S. spot ..	lb 22½d–23d

Transformer Advertisement

Referring to their advertisement in our issue of 13th February, Partridge Transformers, Ltd., say that by a mischance the artist who prepared the illustration used as a guide a picture of a transformer made by Thermo Control, Ltd. They express their regret and say that their future advertisements will include a faithful reproduction of their own transformer.

Trade Announcements

Mr. B. Tolhurst, 36, Swiss Drive, Ashton Vale, Bristol, 3 (telephone : Bristol 61783), has been appointed representative by **T.M.C.-Harwell (Sales), Ltd.,** for the sale of Temco accessories and clocks in Bristol, South West England and South Wales.

Gent & Co., Ltd., have made arrangements for a depot to be established at 3a, Berkeley Place, Clifton, Bristol, 8 (telephone 25655), under the direction of J. W. Equipment, Ltd. It will be responsible for the company's business in the South Western area and will carry stocks of most products.

The Manchester branch of **Drake & Gorham, Ltd.,** is now at 53, Sackville Street, Manchester, 1 (telephone : Central 7866).

Catalogues and Lists

Johnson, Matthey & Co., Ltd., 73-83, Hatton Garden, London, E.C.1.—Data sheet illustrating turned and composite contacts (2322).

Aryn Drawing Mills, Ltd., 2, Pancras Street, Tottenham Court Road, London, W.C.1.—Weight list of solid drawn copper tubes (C.1).

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.—"Mazda" fluorescent lamp folder (L.917).

Wardle Engineering Co., Ltd., Elsinore Road, Old Trafford, Manchester, 16.—Seven illustrated priced folders covering reflectors, floodlights, fluorescent fittings, industrial bulkhead and prismatic fittings, and flameproof and glassware fittings.

Evershed & Vignoles, Ltd., Acton Lane Works, Chiswick, London, W.4.—Illustrated catalogue describing the range of Evershed electronic repeater equipment (266) and the "Ducter" low resistance testing set instruction book (269).

Automatic Telephone & Electric Co., Ltd., Strowger Works, Liverpool, 7.—"A.T.M." mine telephone and signalling equipment catalogue (1165).

The Telegraph Construction & Maintenance Co., Ltd., 22, Old Broad Street, London, E.C.2.—Illustrated booklet dealing with the laying of communication cables between Copenhagen and Roskilde, Denmark.

Dallow Lambert & Co., Ltd., Spalding Street, Leicester.—Illustrated catalogue containing technical information and data on the "Dustmaster" series of dust control units (25) together with price list (26).

Clang, Ltd., Crown Yard, Cricklewood, London, N.W.2.—Coloured display card illustrating a wide range of Clang electrical accessories and conduit fittings.

The Belmos Co., Ltd., Bellshill, Lanarkshire.—Leaflet describing type "S.B.A. 75" flameproof air-break circuit-breaker distribution panel (101/2).

Cushman & Denison Co., Ltd., 124, Vassall Road, London, S.W.9.—Leaflets relating to "Flo-master" inks for use in felt tipped markers, and the "Flo-master Fountain-brush."

Tudor Accumulator Co., Ltd., 137, Victoria Street, London, S.W.1.—Illustrated catalogue of stationary cells for emergency lighting (66/A).

York Shipley, Ltd., 341-9, Corn Exchange Buildings, Manchester.—Descriptive brochure on the "Locker Plant" food storage centre (YS.525).

All-Electric Kitchen Planning

Suggestions for Improving the "Unit" System

By A MANUFACTURER'S REPRESENTATIVE

THIS subject, which is of interest to every housewife, was raised by the author in the *Electrical Review* of 28th April, 1944, just after a forecast by Lord Woolton, then Minister of Reconstruction, which has been more or less realized. This forecast, taken from E.D.A. Publication No. 1622, was as follows:—

> "In our plans for the post-war world we expect to make great strides to ensure that electricity will be generally available. . . . Let scientific application be used to reduce domestic labour, waste and bad living conditions. The house which for the poorer people has so often been a matter of domestic drudgery, can by the use of science be made into a place where a woman has leisure and pleasure. I believe a nation of our great manufacturing capacity can produce labour saving devices in bulk and at standards and prices within the reach of the mass of the people."

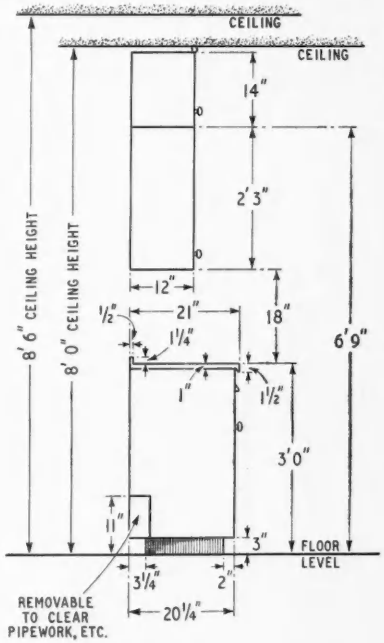
Since that time various manufacturers have developed kitchen equipment with standardized measurements of 36in by 21in by 21in and in accordance with B.S. 1195: 1948. In so far as electrical appliance manufacturers are concerned, this has influenced the dimensions of cookers, 3 and 4½ cu ft refrigerators, washing machines and water heaters each of which may be used with equipment conforming to the above specification.

Only one or two firms are marketing a limited range of electric kitchen units, but this has no doubt been due to the enormous post-war demand for electrical appliances of all types, coupled with shortage of raw materials and the emphasis on supplies for the export market.

There is no doubt that the average housewife appreciates the ease of working in a correctly planned kitchen. Although the cost of completely fitting out her kitchen may be a major item of expense, standard dimensions enable equipment to be purchased piece by piece and usually some form of easy purchase scheme is available to her. Let us consider the various electrical units individually and how they could better meet the requirements for a planned kitchen.

Despite the standardization of cabinet measurements, cookers for one reason or another are still based on pre-war design, the oven being underneath the grill chamber with fuses and wiring connections and mechanical details situated behind a panel on the right-hand side. This is impracticable for servicing when the cooker is built in with other units and difficult in any case.

It is therefore suggested that alternative models should be available in which the space now occupied by the oven is used as a cupboard for cooking utensils and the oven with drop-down door supplied as a



Section through base and wall cabinets of standard kitchen equipment

separate unit to stand on top of a standard cabinet. This will give a more convenient loading height for the oven.

Is the present average 6in splashplate adequate? I suggest that a control panel could with advantage take the place of the splashplate; this could incorporate the cooker control unit, fuses, main terminals and all control switches, wiring and "Simmerstats." Pilot lamps are highly desirable; they would indicate at a glance if any part of the cooker was "on." This panel should be a rigid fixture mounted about 12in above the hob and thus clear of saucepans, etc. The intervening space would be completely covered by an extended splashplate. The depth required to accommodate this panel would be 2–2½in, allowing ample clearance for the cooker circuit wiring. One other advantage of this arrangement would be a really large oven.

The development of the sink unit has produced some very attractive designs, but little or no provision has been made for incorporating electric water heating apart from such free-standing types as are suitable for use under the draining board. The working height of the standard draining board is 36in, which leaves a vacant space underneath of at least 20in by 20in by 33in. This can accommodate expansion pipe connections, flow and return pipes, etc., and it has been found that the space will comfortably take a standard galvanized 20–25 gallon hot water tank or copper cylinder. If this tank is fitted with one or more immersion heaters it will provide sufficient water at 145 deg F for two baths in succession and give a minimum pipe run to the sink. It can be lagged with a proprietary lagging jacket or preferably enclosed and the surrounding space lagged with re-granulated cork. With the tank enclosed, it is suggested that the control switch and pilot light should be fitted flush to the front panel at waist level.

One or two "drying cupboards" have appeared on the market, designed as separate units, but they do not conform with the standard measurements quoted above, and alternative models would appear to be desirable. In the meantime, the collapsible type clothes dryer can be stored in the broom cupboard.

The recognized table top designs of refrigerators have proved a complete success and lend themselves admirably to a built-up kitchen using standard units. With built-up kitchen equipment, it becomes more than ever necessary for the identification or series number plate to be

Kitchen of a six-roomed house before (with gas) and after reconstruction

easily visible and not as at present concealed in some inaccessible position.

Little or no development of the plate-warmer and hotcupboard appears to have taken place, except for a design which does not fit in with these unit measurements, but the single or double base cabinet could be utilized for a variety of purposes. As a hotcupboard, the internal fittings would present no design problem; elements of a suitable loading could be fixed at the bottom, with a control switch and pilot indicator at waist level. The worktop, as the demand arose, could be made to provide an excellent plate-warmer or carving table.

Storage units have been developed into an excellent range of equipment and there would appear to be little improvement needed. It can be suggested, however, that underneath the wall cabinets suitable lengths of architectural or strip lights could be installed for the lighting of work surfaces.

If these units are fitted near the wall there is little likelihood of damage and ample space exists for control gear and concealed wiring. The base of the wall cabinet and the wall surface give a reflection without additional fittings.

A serving hatch, if constructed, should not be less than 38in from ground level, to enable food and plates to be passed easily through from the 36in working surface.

All floor units must be fitted carefully and levelled. Many types of work surfaces are available—stainless steel, porcelain enamel or the many forms of hard-wearing plastics in various and attractive colours.

A conveniently planned kitchen will be worked out in full detail before delivery of the units and if this is done ample provision can be made for all lighting and power outlets. This provides an excellent opportunity for a 30 A ring main which will provide ample capacity for refrigerator, washer, ironer, exhaust fan, kettles and small appliances. Cooker and water heater circuits should also be installed at this stage.

A wide variety of kitchens have already been "converted" with great satisfaction to the owners, and examples are illustrated.

Now that the restrictions on private building have been eased a little, there is definite business to be obtained from all owners of new property and every house, old or new, has a kitchen, every kitchen has a sink and every sink should have hot water. The up-to-date kitchen should also have an electric cooker, refrigerator, washing machine, ironer, vacuum cleaner, kettle, percolator, toaster, food mixer and heat controlled hand iron. The kitchen is the workroom of every house and it is the function of the electrical supplier and the manufacturer to co-ordinate the general layout and installation.

I am indebted to the Hotpoint Electric Appliance Co., Ltd., for the illustrations.

Modernization of the kitchen of a large country cottage—before and after

NEW BOOKS

Television. By F. Kerkhof and W. Werner. Pp. 434; figs. and index. Philips Technical Library. Cleaver-Hume Press, Ltd., 42a, South Audley Street, London, W.1. Price 50s.

In the foreword to this book, Mr. Geoffrey Parr of the Television Society mentions the lack of books on television engineering. This is particularly so with regard to publications on this side of the Atlantic and it is therefore gratifying to see such an excellent work as this one make its appearance.

It is, perhaps, a little humiliating for the British television engineer that the first really comprehensive television text-book has been written by two Dutch engineers (first in their native language and later translated into English, French and German). This country has led the world in many aspects of television and has certainly been far ahead in Europe but the British engineer never seems to have the time to write down his experiences for the benefit of others; perhaps he is too impatient to press on to the next phase of his work. Although the Dutch television transmissions have been established for only about twelve months and are thus still in the experimental stage, with very few programme hours per week, the Philips engineers have through their world-wide organization been able to make significant contributions to the general development of television.

In order to make the book as comprehensive as possible the authors have devoted the last chapter to the description of two "typical" receivers. We think this was a mistake, since it appreciably lowers the prestige which the remainder of the book deserves. The lack of practical experience in their own country shows through here and, in any case, the design of complete television receivers changes so rapidly that while the earlier chapters will be of lasting value to the development engineer, the final chapter was almost out-of-date before it came off the press. The reader should thus exercise care in accepting the arguments governing the design of complete receivers.

With this qualification we can thoroughly recommend the television development engineer, the television service engineer, and, indeed, any electronics engineer wishing to advance his knowledge of television engineering, to place this book in an accessible position on his desk.—J.E.C.

Industrial Brazing. By H. R. Brooker and E. V. Beatson, B.Sc.(Eng.), A.M.I.E.E. Pp. 344; 203 figs. and 32 tables, selected bibliography and index. Published for *Welding and Metal Fabrication* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 35s.

This important book is the first full-length authoritative study of brazing as a process for metal fabrication, the need for which has been evident from the rapid growth in the use of brazing in many manufacturing organizations. The work covers in considerable detail all modern brazing methods: torch, furnace, h.f. induction, resistance, salt bath and dip, while the special considerations necessary in work on aluminium, stainless steels, beryllium-copper, cemented carbides and vacuum tube construction are dealt with separately. A general introduction to the processes and the equipment employed is followed by a review of brazing materials with a summation of the known factors governing joint design. A final chapter discusses the selection of appropriate processes for various types of work and makes a useful contribution to methods of inspection and testing.

The book will prove to be of equal value to those engaged in industries employing brazing processes as to those who are responsible for the design of brazed assemblies. The authors have long been intimately concerned with brazing in mass production systems.

Books Received

Photometry. By J. W. T. Walsh. Second edition. Pp. 544; figs. 281; bibliography and index. Constable & Co., Ltd., 10-12, Orange Street, London, W.C.2. Price 63s.

Electricity in the Home. By C. B. Brook. Sixth edition. Pp. 204; figs. 86; index. Advertiser Press, Ltd., Page Street, Huddersfield. Price 6s 6d.

Electrical Measurements. Part II. By D. Karo. Pp. 343; figs. 281; index. Macdonald & Co. (Publishers), Ltd., 16, Maddox Street, London, W.1. Price 30s.

ELECTRICITY SUPPLY

Flood Damage Repairs

Rhodesian Project Approved

A PROGRESS statement by the Eastern Electricity Board details the number of premises in the Area affected by the floods and the work of electricity supply restoration accomplished up to 15th February. In the Essex Sub-Area most of the work remaining to be done at that date was at Tilbury and Canvey Island, in the Norfolk Sub-Area at Great Yarmouth, and in the Suffolk Sub-Area at Harwich and Jaywick. At Great Yarmouth and Tilbury restoration was expected to be completed in a few days.

Altogether there was interruption of supply to 46,863 premises and at 15th February electricity was again available as far as the consumers' service terminations in the case of 39,195 of these, while 38,463 were taking a partial or full supply. Premises in which consumers' installations had to be made good before a supply could be afforded numbered 3,365 (a partial supply was available to 200). There remained 5,235 premises to which supplies would not be restored immediately, including those destroyed, uninhabitable or not reoccupied.

Meter Records

Following representations by consumers, the North Western Electricity Board has agreed that, where it is specially requested, meter readers shall hand consumers a special slip with a record of the meter reading. In a letter to the Consultative Council giving this information Mr. A. Heaton, chief accountant of the Board, stated that if cards were introduced at the request of some consumers it would very possibly lead to an extension, which would involve cost in time and money.

S.E. Scotland Commercial Tariff

Under a new commercial tariff introduced by the South East Scotland Electricity Board smaller commercial consumers will be charged for a certain number of kWh (dependent upon the size of the consumer's installation) at either 3½d (Edinburgh) or 4½d/kWh (the rest of the Area); for a further number of kWh at 1½d and for all consumption in excess at 1d. For the larger consumers a two-part tariff will be available under which the annual maximum demand will be charged at £7 10s/kW with a "unit" charge of 0·65d, plus cost of fuel adjustment (which at present is about 0·22d/kWh). Concessions will be made to meet special circumstances, for example, off-peak supplies and commercial catering. The new tariff will result, on average, in an increase of 8 per cent on the present charges.

Kafue Gorge Scheme

The Ndola correspondent of *The Times* reports that the Northern Rhodesian Legislative Council has approved the Kafue Gorge scheme (*Electrical Review*, 6th February). The Government has been authorized to proceed immediately with the task of securing the necessary finance for the project.

Street Lighting Charges

A deputation from North-East local authorities has made representations to the North Eastern Electricity Consultative Council against higher street lighting charges to be brought into operation on 1st April by the Board. The deputation represented about twenty local authorities and the spokesman was Mr. H. Ayrey, Town Clerk of South Shields, who prepared the case for the opposing Councils. The meeting was in private. The following day Mr. Ayrey received a letter from Mr. W. S. Hall, chairman of the Consultative Council, stating that the local authorities' case had been carefully considered, but the Consultative Council could not support the claim for modification of the proposed terms. Commenting on the result, Mr. Ayrey said he thought due weight had not been given to the argument that local

Full details of standard tariffs in operation in England, Scotland and Wales are given in "Electricity Tariff Handbook" published this week by Electrical Review Publications, Ltd., and distributed by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1, price 7s 6d (postage 3d). It has been compiled with the advice and assistance of Mr. V. A. H. Clements, M.I.E.E., Assistant Commercial Manager of the B.E.A.

authorities should be encouraged to provide good street lighting for the safety of the public by keeping costs as low as possible.

The proposed new terms will cost Sunderland £4,000 more per annum, South Shields £1,100 and Newcastle £1,500, while at Middlesbrough the increase will be about 20 per cent. No further action against the terms is likely.

Freedom of Choice Conceded

After considering a letter from the East Midlands Electricity Board, Boston (Lincs) Town Council has decided that in future tenants of Council houses shall be given the type of cooker preferred without being required to pay the difference in price between a gas cooker and a comparable electric cooker.

Boards' Sales in January

In the table below analysing electricity sales in January the national figures show an increase of 4·3 per cent over January, 1952, but, when corrected for weather and the number of effective working days, the increase is approximately 6 per cent. The weather conditions were colder in the south but warmer in the north than in the corresponding month of last year. No account is taken of the comparatively small supplies received by Area Boards from other sources than the B.E.A.

Some major changes in supplies have taken place during the last two years which affect the comparisons. Part of the percentage increase in the twelve-monthly figures for the Southern Board, for example, is due to the new oil refinery at Fawley, which came into production in the summer of 1951. In the case of South Wales, supplies to the new steelworks at Margam and Trostre which commenced in the summer of 1951 still have an effect on the twelve-monthly figures, as also has the reduction of supplies taken by a large consumer in the area. The increases for Yorkshire are partly due to the improvement in the textile industry.

Volta River Scheme

It is announced that Cdr. R. G. A. Jackson, Royal Australian Navy, has been appointed special commissioner by the Gold Coast Government to take charge of the preparatory commission for the Volta River hydro-electric scheme. Cdr. Jackson has previously advised the Indian Government upon hydro-electric and irrigation projects.

Cooker Maintenance

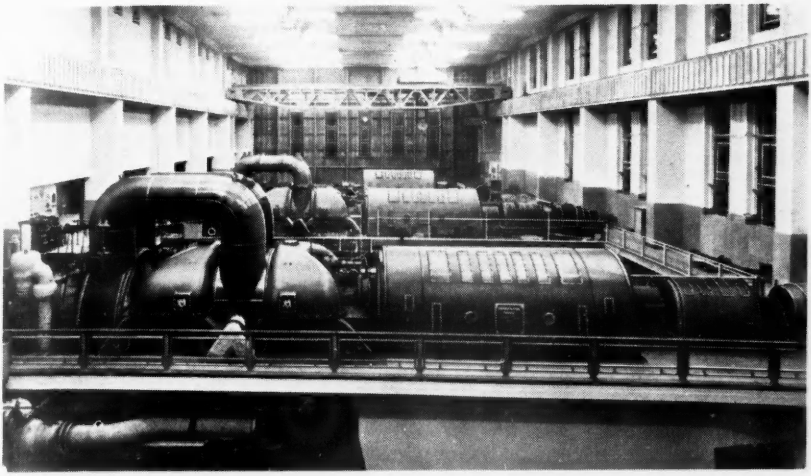
On the recommendation of the Whitehaven Town Council, the House Management Committee is to reconsider its proposals that tenants of Council houses should bear the full cost of replacements to electric cookers. The cost of replacements has risen to about £2,800 per annum covering about 1,000 houses.

ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for January			Cumulative totals for first 10 months of financial year			Totals for 12 months ended 31st January		
	1952 Mill. kWh	1953 Mill. kWh	Inc. or Dec. %	1951 2 Mill. kWh	1952 3 Mill. kWh	Inc. or Dec. %	1952 Mill. kWh	1953 Mill. kWh	Inc. or Dec. %
London	595·3	645·4	+ 8·4	4,252·5	4,446·9	+ 4·6	5,275·7	5,193·0	+ 1·1
South Eastern	328·1	357·9	+ 9·1	2,424·4	2,576·6	+ 6·3	2,987·5	3,167·0	+ 6·0
Southern	376·3	415·0	+ 10·3	2,776·5	3,014·7	+ 8·6	3,403·3	3,688·5	+ 8·4
South Western	180·3	196·7	+ 9·1	1,368·2	1,454·3	+ 6·3	1,682·8	1,774·2	+ 5·4
Eastern	526·5	575·2	+ 9·2	3,961·1	4,207·2	+ 6·2	4,873·8	5,147·1	+ 5·6
East Midlands*	442·6	474·8	+ 7·3	3,458·9	3,606·4	+ 4·3	4,220·1	4,388·9	+ 4·0
Midlands*	608·4	628·7	+ 3·3	4,693·8	4,878·7	+ 3·9	5,733·6	5,961·4	+ 4·0
South Wales*	298·3	312·8	+ 4·9	2,587·4	2,729·7	+ 5·5	3,075·8	3,281·3	+ 6·7
Merseyside & N. Wales*	347·3	336·9	− 3·0	2,848·2	2,747·2	− 3·5	3,468·4	3,367·3	− 2·9
Yorkshire*	571·5	595·3	+ 4·2	4,527·2	4,762·2	+ 5·2	5,508·3	5,781·7	+ 5·0
North Eastern*	347·1	340·6	− 1·9	2,913·4	2,873·3	− 1·4	3,526·2	3,502·2	− 0·7
North Western*	666·6	656·5	− 1·5	5,314·8	5,1[illegible]8·8	− 2·6	6,435·9	6,343·4	− 1·4
South East Scotland	129·6	127·6	− 1·5	965·2	1,008·2	+ 4·5	1,181·8	1,232·2	+ 4·3
South West Scotland*	313·4	306·4	− 2·2	2,353·4	2,428·4	+ 3·2	2,886·7	2,972·6	+ 3·0
Total all Area Boards	5,731·3	5,969·8	+ 4·2	44,445·0	45,914·6	+ 3·3	54,259·9	56,100·8	+ 3·4
Direct Supplies by Central Authority	64·8	75·3	+ 16·2	584·7	620·6	+ 6·1	701·9	745·2	+ 6·2
Grand Total	5,796·1	6,045·1	+ 4·3	45,029·7	46,535·2	+ 3·3	54,961·8	56,846·0	+ 3·4
Mainly Industrial Areas marked*	3,595·2	3,652·0	+ 1·6	28,697·1	29,2[illegible]6·7	+ 1·8	34,855·0	35,598·8	+ 2·1
Mainly Non-Industrial Areas	2,136·1	2,317·8	+ 8·5	15,747·9	16,707·9	+ 6·1	19,404·9	20,502·0	+ 5·6
Total Number of Effective Working Days	28·73	28·10		277·7	4277·17				

* Over half the total sales by the Boards in the preceding financial year were to industrial consumers.

MANUFACTURING PROGRESS, 1952



Metropolitan-Vickers Electrical Co., Ltd.

As usual in our yearly reports relating to the activities of the largest electrical manufacturing concerns we head the list with electricity generation and supply equipment, and with steam generation plant first in this section. Seventeen Metropolitan-Vickers turbo-generator sets having an aggregate capacity of 525 MVA were put into commission. For the British Electricity Authority two 52·5 MW sets with steam conditions of 900 lb/sq in and 900 deg F were started up at Brunswick Wharf (Poplar), as were the second and third 31·5 MW sets at Princes Rock (Plymouth). Overseas the largest machine put into service was a 50 MW turbo-generator set at Pyrmont "B" (Sydney), with steam conditions of 1,200 lb/sq in and 925 deg C.

Orders for many large generating sets were received from the B.E.A. whose 1957 programme includes a fourth 100 MW set for Castle Donington which, with a planned capacity of 600 MW, is expected to be the largest power station in Europe. The turbines will have steam conditions of 1,500 lb/sq in and 1,050 deg F.

Important export orders include that for two further 30 MW turbo-generator sets for the Salt River station of the South African Electricity Supply Commission.

Industrial orders included two from Pakistan—for a 6,000 kW set for an ordnance factory and a 4,500 kW set (the third) for the Chittagong paper mill. An unusual machine is a geared d.c. set consisting of a 2,550 kW back pressure turbine driving two 1,275 kW 600 r.p.m. d.c. generators in tandem for a chemical works in Widnes.

The 15 MW gas turbo-generator set which was put on load at Trafford power station is the first gas turbine plant to be commissioned for the B.E.A. The turbine operates on an open compound cycle with l.p. and h.p. compressors and turbines, and it is designed for an inlet temperature of about 1,200 deg F at both turbines and an overall pressure ratio of 10 : 1. Hydro-electric generator sets completed included four vertical shaft machines—the last of three 14,100 kVA Pelton wheel sets for Moyar (Madras), the third of four 17,100 kVA Francis wheel sets for the Kiewa

Above: **The second and third 31·5 MW turbo-alternator sets at Plymouth "B" power station were started up during 1952**

power station (Victoria), the first of two 8,333 kVA Kaplan turbine sets for Torr Achilty (Scotland), and the first of two 3,500 kVA 600 r.p.m. Francis turbine sets for Colmenar (Spain).

High frequency generators for supplying induction furnaces were made for frequencies ranging from 9,750 to 1,500 c/s. Three 2,200 c/s motor-generator sets with a total capacity of 500 kVA were ordered. Large synchronous condensers in the course of manufacture included a 40,000 kVA machine for Victoria (Australia) and two of 30,000 kVA for the New Zealand hydro-electric system.

Transformer activities included the despatch of equipment of sizes from 5 to 60 MVA, and among the large units supplied to the B.E.A. was a 55·5 MVA 11·8/132 kV generator transformer for Brunswick Wharf. Overseas shipments included three 50 MVA three-phase transformers with fully insulated windings and type H on-load tap changers, two for the Netherlands with voltage ratios of 150/52·5 kV and 150/106 kV and one for Poland with a voltage ratio of 115/63 kV and a 6·3 kV tertiary winding. An order was received from the B.E.A. for four more 120 MVA 132/275 kV auto-transformers for the Castle Donington transmission station. They will be fitted with on-load tap changing gear giving a voltage variation of plus and minus 15 per cent in eighteen steps. Distribution transformer designs were completed for the range covered by the new British Electricity Specification T1, and several orders for such equipments were received from Area Boards. Outdoor current transformers of the wound primary pattern for use with 132 kV air-blast circuit breakers were being manufactured for Carrington, Portishead and Tilbury. Rectifier developments included three 2,400 kW mercury arc rectifier equipments for traction duty in Glasgow, while export orders included two rectifiers for electrolytic service in Pakistan.

High Voltage Switchgear

In the switchgear field many outdoor e.h.v. air-blast circuit breaker units were in the course of manufacture, including 275 kV 7,500 MVA units for Staythorpe transforming station (B.E.A.), 220 kV units for San Esteban (Spain), and 165 kV units for Cabril. Oil circuit breaker shipments included eighteen 132 kV 2,500 MVA units for Iberduero (Spain), while similar units were in hand for Clyde's Mill (B.E.A.). These breakers have eight breaks per phase. For rural electrification schemes, orders for 11 kV 75 MVA pole-mounted circuit breakers came from home and abroad. These breakers are now rated at up to 200 A and are fitted either for hand operation or for automatic reclosing. A new divertor, type LV, extends the range to medium voltages and is suitable for a.c. systems up to 750 V. It will handle a surge of at least 1,500 A. Large single-break switchboards were put into service at Bankside and Plymouth "B" with their control boards, and a 2,000 A version of the SB24 breaker was introduced on a five-panel single-busbar board at the Low Road substation of the Yorkshire Electricity Board.

Equipment for Africa

For distribution systems of the Anglo-American Corporation of South Africa 250 MVA metalclad units of the "K" type have been supplied for the Copper Belt of Northern Rhodesia, and five 14-panel 6·6 kV switchboards have been ordered for a new township scheme in the Orange Free State.

For use with such equipment as fuse-switch distribution gear a 200 A change-over switch has been introduced to allow selection of the source of supply. Many "K" type metalclad switchboards of breaking capacities up to 250 MVA at 11 kV were in hand for the National Coal Board: for example, a 13-panel 11 kV electrically operated switchboard and several 3·3 kV boards for Clipstone.

Valuable orders were received from overseas for instruments, meters and protective gear, and the success of the "Transva" meter for measuring kVA demand was evidenced by repeat orders. In relays and protective gear an intensive period of development was completed and the design of "Contra-phase" (phase-comparison carrier current) protection was standardized.

Under the heading "industrial and commercial electrification" we can refer to the many large a.c. motors which were in the course of manufacture or ordered, including synchronous induction machines fitted with the "Vax" system of automatic excitation; for instance, a 2,000 h.p. 125/187·5 r.p.m. rolling mill motor which, with

its diameter of 17½ft, is believed to be the largest two-speed 11 kV motor of its type. A number of motors were also ordered for driving winders and haulages. Most of the winder motors will be equipped with the company's patented scheme of dynamic braking in which the load current automatically controls the motor excitation. Special control gear was developed for industrial drives, ranging from "Metadyne" and magnetic amplifier control of strip tension in rolling mills to a new geared motor unit for a heavy duty rheostat.

In connection with cranes, standard motors, control gear and "Perigrip" brakes were in steady demand from the crane manufacturers, while "Stacreep" control equipment was installed on a Wharton 10 ton overhead crane recently installed in the Metrovick transformer shops at Trafford Park. An electronically controlled drive was applied to Jensen lifts at the American Embassy and Naval Headquarters and at the Aquascutum shop in London. Many special drives were developed for leading machine tool manufacturers, as was evidenced at the International Machine Tool Exhibition held in London last September.

Multi-operator arc welding equipment of the transformer type continued to be in great demand, and d.c. types were also supplied, notably two five-operator engine-driven sets for use in Pakistan. A six-operator d.c. motor generator equipment was ordered for the North Thames Gas Board. Electronically controlled automatic arc welding machines included one supplied to Samuel Fox, Sheffield, for the testing of welding electrode wire. A 10-head motor-operated spot welder was made for welding stainless steel evaporators for refrigerators; it welds 900 spots a minute, the evaporators being fed into the machine by hand.

Industrial Heating

Induction furnaces for both melting and heat treatment were a highlight of the industrial heating equipment produced, and one equipment for the manufacture of X-ray tube anodes was arranged for a continuous sequence of melting, casting and controlled cooling, all *in vacuo*. A high-temperature vacuum sintering furnace installed in a Government research establishment enables 2,000 deg C or over to be attained in a vacuum of 10^{-4} mm Hg; the temperature is closely regulated by a combination of proportional and floating control initiated by a radiation pyrometer of the cæsium cell type. Dielectric heating was applied to the heating and drying of various commodities, and problems dealt with included heating cork aggregate for making linoleum, drying various textiles, and the final drying of dehydrated food.

The growing demand from industry for heating elements of the sheathed type partly offset a temporary setback in the domestic field, where the demand for radiant boiling plates has been affected by Australian import restrictions, shortage of money, and curtailment of hire purchase.

Outstanding examples of the many new lighting schemes installed are those in an ordnance factory, paper and textile mills, a printing works, and a magneto factory, some of them employing fluorescent lamps. Vapour-tight fittings were supplied for the Fawley oil refinery.

Inspection in Industry

DURING 1951 a visit was paid to the United States by a specialized team to investigate American practice in the sphere of inspection in industry. This team's report has now been published (3s including postage) by the British Productivity Council, 21, Tothill Street, S.W.1.

Although most of the study was made in the light engineering and non-ferrous alloy industries, the statement of principles and practice of industrial inspection should prove useful to other than engineering industries. Although the best British practice is said to be not behind the best in the United States, in the latter country there is a broader conception of the term "quality control" and greater general enthusiasm for the subject which is shared by the workers.

The general recommendations set out in the report include one urging the establishment of a technical qualification in inspection such as is already under discussion by a leading examining body. It is considered that the teaching of "statistical engineering" (statistical methods applied to production, inspection and experimentation) should form part of all production engineering courses. Sampling inspection should be adopted by the purchasing divisions of Government Departments, nationalized industries and other large organizations and mass-production industries should give more attention to the mechanization of inspection.

Recommendations to individual firms suggest methods of introducing and operating quality control, including the selection and training of people for the work and continued "publicity" to acquaint the staff and workers with the need for continuous check on quality.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

R. A. Lister & Co., Ltd., held their annual meeting on 16th February, when Sir Percy Lister (chairman), who presided, in referring to world trading conditions, said that shortages of sterling and the economic and political conditions in many of the world's markets had brought about a total prohibition of business in a number of important foreign markets and a much restricted importation through licensing arrangements in others. But for these factors, the excellent trading results of the company for the past year would have been still better. The large arrears of orders had been considerably reduced, with the result that they were able to offer prompter deliveries. During the year under review they had introduced their "Freedom" range of diesel engines for land and marine purposes, and the demand for these engines, which were capable of being adapted as prime movers to a great variety of electrical and industrial equipment, was already most encouraging. They had entered into arrangements with the National Supply Co. in America which should considerably enhance the sale of their engines in that country.

The English Electric Co., Ltd., in a preliminary statement, reports that after providing £1,121,968 for depreciation, there is a group profit of £4,359,034 for 1952, as compared with £3,642,141 for 1951. Taxation absorbs £2,909,516, leaving a net balance of £1,449,518 (against £1,355,530), of which £1,383,057 is attributable to the English Electric Co. It is proposed to pay a final ordinary dividend of 10 per cent, making 15 per cent for the year. This is at the same rate as for the preceding year, but is payable on a capital increased from £4,128,520 to £5,308,097. The annual meeting will be held on 19th March.

Marconi's Wireless Telegraph Co., Ltd., reports a profit for 1952 of £576,704, as compared with £331,381 for the preceding year, and after providing £384,527 for taxation, there is a net balance of £192,177 (against £159,667). Depreciation equalization reserve receives £25,000, and the ordinary dividend for the year is unchanged at 7 per cent.

The Marconi International Marine Communication Co., Ltd., reports a profit for the year ended 31st December last of £337,093, as compared with £361,276 for 1951. Taxation requires £260,000, leaving a balance of £77,093 (against £138,276). The dividend for the year is unchanged at 10 per cent by a final payment of 6 per cent.

D. Napier & Son, Ltd., report a profit of £322,436 for 1952, as compared with £318,561 for the previous year, and a net balance, after deducting £224,000 for taxation, of £98,436 (against £135,561). The ordinary dividend for the year is maintained at 7½ per cent.

The Westinghouse Brake & Signal Co., Ltd., reports a group trading profit for the year ended 27th September last of £1,183,732, as compared with £701,140 for 1950-51, and after meeting all charges, including £720,843 for taxation, the net profit of the parent company is £256,603 (against £212,366). Replacement plant reserve receives £105,000 and general reserve £50,000. It is proposed to pay a dividend for the year of 15 per cent (against 14 per cent), and to carry forward £178,428 (against £147,984 brought in). It is proposed to create £1,000,000 new ordinary shares and, when the consent of the Capital Issues Committee is received, to offer the new shares to existing stockholders at a premium on a rights basis.

Mather & Platt, Ltd., report that after transferring £175,000 to stock contingencies reserve and charging £996,505 for taxation, the net profit for 1952 is £428,790, as compared with £333,313 for 1951. General reserve receives £100,000, and it is proposed to pay a final dividend of 6 per cent (same), and a bonus of 5 per cent (2½ per cent), making a total distribution for the year of 15 per cent (against 12½ per cent). The balance carried forward is £111,367 (against £103,905 brought in).

A. H. Hunt (Capacitors), Ltd., report a profit for 1952, after meeting all charges, including £74,398 for taxation, of £40,834, as compared with £58,479 for 1951. General reserve receives £20,000 and tax equalization £2,000. The final dividend proposed is 17½ per cent, again making 25 per cent for the year, leaving a balance of £41,091 to be carried forward (against £41,288 brought in).

Bakelite, Ltd., in a preliminary statement, reports group profits for 1952 of £562,660, as compared with £687,131 for 1951. Taxation absorbs £321,300, leaving a balance of £241,360 (£320,341). It is proposed to pay a final ordinary dividend of 9½ per cent, making 12½ per cent on capital as increased by a

100 per cent scrip issue in April last. For the previous year the total distribution was 25 per cent on the smaller capital.

Taylor, Tunnicliff (Electrical Industries), Ltd., reports a group trading profit for 1952 of £423,870, as compared with £452,783 for the preceding year, and after providing £207,538 for taxation, the net profit is £157,655 (against £158,970). It is proposed to pay a dividend for the year of 25 per cent (against 20 per cent), and to carry forward £520,298 (against £431,765 brought in).

The Greengate & Irwell Rubber Co., Ltd., reports a net profit for 1952, after deducting £531,000 for taxation, of £288,207, as compared with £501,077 in 1951. It is proposed to pay a final dividend of 10 per cent and a bonus of 10 per cent, making 25 per cent for the year on the reconstructed capital.

The Direct Spanish Telegraph Co., Ltd., reports a net profit, after taxation, of £4,803 for 1952, as compared with £4,321 for 1951. The dividend for the year is 4½ per cent (against 4½ per cent and a special bonus of 5 per cent).

Desoutter Bros. (Holdings), Ltd., reports a group profit for 1952, after taxation, of £65,366, as compared with £63,203 for 1951. Taxation absorbed £293,398. The ordinary dividend for the year is 18 per cent (against 16 per cent for ten months), and the balance carried forward is £30,252 (against £8,047 brought in).

The Electrical & Industrial Investment Co., Ltd., reports that, after providing £42,400 for taxation, the net profit for 1952 is £44,953, as compared with £44,322 for the previous year. The deferred ordinary dividend for the year is 30 per cent (against 25 per cent), and £22,383 is carried forward (against £24,372 brought in).

Radio Rentals, Ltd., proposes to offer 83,250 ordinary shares of 5s each to ordinary shareholders at 12s per share on the basis of one new share for every ten ordinary shares held. The new shares will rank *pari passu* with the existing ordinary shares.

J. Stone & Co. (Holdings), Ltd., proposes, subject to Treasury sanction, to issue 171,543 "A" ordinary £1 shares to holders of ordinary and "A" ordinary stock in the proportion of one for seven. The proceeds of the issue will be used to finance the maintenance and extension of the company's markets abroad. Resolutions authorizing an increase in capital to £2,000,000 will be submitted at an extraordinary meeting to be held on 10th March.

Crabtree Electrical Industries, Ltd., has declared an interim dividend of 7½ per cent (unchanged).

Morphy-Richards, Ltd., has announced an unchanged interim dividend of 15 per cent.

New Companies

A.R.B.E., Ltd.—Registered 12th February. Capital £100. Manufacturers of and dealers in electrical apparatus and equipment, radio and television apparatus, etc. Directors: L. S. Race, Rita M. Race and H. M. Horton. Regd. office: 16, Manchester Square, W.1.

Barker & Millard, Ltd.—Registered 12th February. Capital £2,000. Television and radio electricians, electrical and mechanical engineers, etc. Directors: A. Barker and D. Millard. Regd. office: 16, Clayton Road, Lidget Green, Bradford.

F. Lawrence & Co. (Feltham), Ltd.—Registered 12th February. Capital £1,000. Manufacturers of and dealers in electrical and ventilating engineering apparatus and scientific instruments, etc. Directors: F. Lawrence (governing director), Florence M. Lawrence and D. F. Lawrence. Regd. office: 7/8, Norfolk Street, W.C.2.

Liquidation

Electricity House, Ltd.—Winding up voluntarily. Liquidator, Mr. E. Van Ham, The Oval, Tranmere Park, Guiseley, near Leeds, appointed 13th February.

Bankruptcies

T. R. Hugo, carrying on business under the style of Victor Hugo's at 51, Fawcett Road, Southsea, Hants, as a radio and electrical engineer.—Receiving order made 12th February on debtor's own petition.

W. J. Layton, 148, Studley Road, Redditch, Worcs, formerly carrying on business at 102, Evesham Street, Redditch, electrical engineer. —First meeting held 25th February. Public examination 1st April at the Court House, Corporation Street, Birmingham, 4.

R. A. Squires, carrying on business as Radiotois, at 21, Station Road, Brixton, London, S.W.9, as radio engineer and dealer in electrical and radio goods.—Order made 20th January suspending discharge for nine months until 20th October, 1953.

H. Tansey, residing and lately carrying on business at 53, Hollydale Road, Erdington, Birmingham, electrical contractor.—First meeting 2nd March at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, 2. Public examination 15th April at the Court House, Corporation Street, Birmingham, 4.

S. G. Penrith, lately carrying on business at 5 and 14, Mount Pleasant, Barrow-in-Furness, electrical contractor.—Last day for receiving proofs for dividend 7th March. Trustee, Mr. D. Atkinson, 14, Lowther Street, Carlisle, Official Receiver.

STOCKS and SHARES

RISING prices are again the order of the day in the industrial market lists (see page 497). A batch of good company dividends and reports resulted in a number of outstanding performances by the individual shares concerned and seemed to encourage fresh investment in others that are due to issue their 1952 figures in the near future. In the market for electrical equipment and kindred shares, the season of company results has been given an auspicious opening by such diverse companies as English Electric, Westinghouse Brake and Decca. Excellent figures from Mather & Platt, and an increase in the dividend from 12½ to 15 per cent, caused a rise of 3s 6d in the price of the shares to 48s 6d. Several of the market leaders have further advanced with G.E.C. and C. A. Parsons again well to the fore.

English Electric Earnings

English Electric are bringing the ordinary dividend for 1952 to a total of 15 per cent, as before. With more than a million new shares participating this time, the sum involved in the distribution is up by £93,000. This is almost exactly the amount by which, according to the preliminary statement, the net taxed profits of the group increased during the year. The increase is all that the tax collector leaves from an expansion of more than £700,000 in the group trading profit, after deduction of all other charges. His collection of £2·9 million (from earnings of £4·4 million) compares with the ordinary shareholders' portion of £418,000. By keeping down the rate of dividend, the group is able to retain about a million for use in the business. The results were much as had been expected in the market, and there was no change in the price of the £1 shares at 58s 9d. They show a yield of a little over 5 per cent, which marks them out as a security commanding nvestment confidence well above the average.

Decca's Expansion

Last week's news from the Decca Company included a "rights" issue of new ordinary shares at 5s ; a rise in the dividend from a total of 11²½ to 150 per cent; notice that net profits for the year ended last March were more than doubled at £800,000 (before tax of £423,000); and a proposal for a 400 per cent share bonus. These substantial successes have resulted, says the statement, from a big increase in the group's turnover, particularly in exports, which were enlarged by 50 per cent. Moreover, and with the best part of another financial year already gone, the company is able to report that business has continued to expand. Ha ing been a strongly rising market for some w eks in anticipation of good figures, the 1s shares were advanced further to 23s 6d upon their materialization. The quotation is ex-right to the new shares, which stand at 17s 6d premium.

Westinghouse Brake Results

Having risen from around 53s during the past few weeks in anticipation of good annual results, the £1 shares of Westinghouse Brake & Signal jumped another 2s 6d to 60s on news of the increase in the dividend from 14 to 15 per cent, and of the excellent figures in the profits statement. During the year ended last September, trading profits of the group expanded by nearly 70 per cent, and despite much higher tax charges the net group figure is still some £77,000 better at £396,000. Most of this goes back into the business, for the slightly larger dividend calls for the distribution of only £88,400 net. Fresh capital is called for, partly to finance the continuous growth of the company's activities, and partly because of high taxation, and steps are being taken for an issue of ordinary shares to existing holders by way of rights. The statement expresses confidence about the maintenance of the present rate of dividend on capital so increased.

Bakelite

The final dividend and preliminary profits statement published last week by Bakelite, Ltd., were the first to be issued since the company's 10s shares were marketed last April. They were up to market expectations, as modified recently by the evidence of difficult conditions in the plastics industries during the past year, and the price of the shares rose by 1s 3d to 17s 6d. Profits are appreciably lower than before, but there is still over £140,000 to spare after maintaining the dividend at 12½ per cent, which is equivalent to the payment made previously on half the present issued capital of £1½ million: this is all in ordinary stock.

Taylor Tunnicliff Dividend

The 5s shares of Taylor Tunnicliff (Electrical Industries) were marked up from 19s 3d to 20s 6d on satisfaction with the increase in the ordinary dividend from 20 to 25 per cent. Net profits after tax are very much the same as before, but the extra payment makes only a small impression on the wide margin which it is the company's practice to maintain between surplus profits and distributions. The latest payment still appears to have nearly fourfold cover by earnings. Profits retained are appropriated mainly for adding to the carry-forward. Having been raised by some £90,000, this item will now exceed the total issued capital of half a million, of which £300,000 is in ordinary stock. The yield on the shares from the new rate of dividend is £6 2s per cent.

ELECTRICAL INVESTMENTS

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 23rd Feb. 1953	Week's Rise or Fall	Est. Yield p.c. £	s	d
Gilt-edged and Overseas Stocks							
Brit. Elec. 1968/73	3	3	86	—	3	9	9
Brit. Elec. 1974/77	3	3	83½	—	3	11	10
Brit. Elec. 1976/79	3½	3½	90½	—	3	17	4
Brit. Elec. 1974/79	4½	4½	99½ xd	—	4	5	5
Calcutta Elec. ..	6†	6†	20/-	—	6	0	0†
East African Power	7	7	23/-	—	6	1	9
Nigerian Elec. ..	10	10	21/9	—		—	
Palestine Elec. "A"	5†	Nil	9/-	+1/-		—	
Perak Hydro-Elec.	Nil	Nil	14/6	—		Nil	
Equipment and Manufacturing							
AberdareCables(5/-)	20	25	16/9	+3d	7	9	3
Aerialite (1/-) ..	83½	88½	9/6	—	9	6	0
Allen, W. H. ..	15	15	43/9	—		—	
Aron Elec. Ord. ..	15	15	38/9	+⅛	7	14	10
Assoc. Elec. Ord...	20	20	78/9	—	5	1	6
Automatic Tel. & El.	15	15	61/-	−3d	4	18	4
Babcock & Wilcox	18	18	71/-	−1/-	5	1	6
Baldwin, H. J. (2/-)	25	20	4/-	+6d	10	0	0
Bakelite (10/-) ..	—	12½	17/6	+⅛	7	2	9
British Aluminium	10	12	42/-	—	5	14	3
B.I. Callender's ..	7½	9	35/3	—	5	2	3
British Thermostat (5/-)	30	30	33/3	+9d	4	10	3
British Vac. Cleaner (5/-)	25	25	16/-	+1/-	7	16	3
Brook Motors (10/-)	20	20	32/6	—	6	3	1
Brush Ord. (5/-) ..	10	10	5/-	—	10	0	0
A. F. Bulgin (1/-)..	27½	30	2/7½	—	11	8	6
Burco (5/-) ..	38½	35	19/6	+3d	8	19	6
Chloride El. Storage	15	15	68/9	+⅛	4	7	3
Cole, E. K. (5/-) ..	25	25*	18/6	+1/-	6	15	3
Cossor, A. C. (5/-)	Nil	10	11/-	+6d	4	11	0
Crabtree (10/-) ..	17½	17½	32/6	+6d	5	7	8
Crompton Parkinson Ord. (5/-) ..	11¼	11¼	9/6	—	5	18	5
De La Rue (5/-) ..	50	35*	9/-	+1/-		—	
Decca (1/-) ..	112½	150	23/6xr	+⅛	6	7	6
Dewhurst (2/-) ..	22½	19*	5/3	+3d	7	4	9
Dictograph Tel. (2/-)	20	20	5/9	+3d	6	19	3
E.M.I. (10/-) ..	12	12	13/9	+6d	8	14	6
Electrical Components (5/-) ..	20	20	10/-	—	10	0	0
Elec. Construction	15	15	55/-	—	5	9	1
Enfield Cable Ord.	7½	7½	24/-	—	6	5	0
English Electric ..	15	15	58/9	—	5	2	0
Ericsson Tel. (5/-)	22†	22*†	43/3	+3d	2	10	9†
Ever Ready (5/-)..	35	35	27/6	—	6	7	3
Falk Stadelmann..	15	15	42/3	+3d	7	2	0
G.E.C. Ord. ..	22½	22½	45/3	+1/9	4	19	5*
General Cables (5/-)	30	30	15/-	—	10	0	0
Greenwood & Batley	15	15	38/3	—	7	16	10
Hackbridge Cable (5/-)	20	20	11/9	—	8	10	3
Hackbridge Hewittic (5/-)	18	20	16/3	—	6	3	0
Hall Tel. Acc. (10/-)	10	10	9/6	+3d	10	10	6
Heatrae (2/-) ..	12½	12½	4/-	—	6	5	0
Henleys (10/-) ..	20	20	18/9	+3d	5	6	8*
Holophane (5/-) ..	15	20*	11/6	—	8	14	0
Hoover (5/-) ..	37½	35*	24/6	+3d	7	2	9
Equipment and Manufacturing (continued)							
Intl. Combustion (5/-)	20	25	13/6	—		—	
Johnson & Phillips	15	15	57/-	—	5	5	3
Lancashire Dynamo	22½	12½*	45/-	+⅛	5	11	1
Laurence,Scott(5/-)	12½	15	13/9	+6d	5	9	1
London Elec. Wire	12½	12½	57/6	—	4	7	0
J. Lucas	7½	9½	40/-	—	4	11	8
Marryat & S. (2/-)	22½	22½	5/-	—	9	0	0
Mather & Platt ..	12½	15	48/6	+3/6	6	4	0
Metal Industries ..	10	15	44/6	−⅛		—	
Mid. Elec. Mfg. ..	15	15	59/6	—	5	0	9
Murex	12½	15	58/-	—	5	3	6
Newman Ind. (2/-)	6	10	2/3	—	8	17	10
Oldham & Son (1/-)	30	35	2/6	—		—	
Parnall (Yate) (5/-)	6	6	3/4½	−1½d	8	17	10
Parsons, C. A. ..	15	10*	65/-	+⅛		—	
Plessey (5/-) ..	22½	25	22/6	—	5	11	1
Pye Deferred (5/-)	18	18	17/3	—	5	4	4
Revo (10/-) ..	27½	27½	45/6	+1/-	6	1	0
Reyrolle	15	10*	57/6	+⅛		—	
Scot. Cable (4/-) ..	30	32	12/3	—		—	
Siemens Ord. ..	10	10	36/-	+6d	5	11	0
Southern Areas ..	Nil	5	12/9	+6d	7	16	9
Strand Elec. (5/-)..	17½	17½	8/9	—	10	0	0
Sturtevant (5/-) ..	16¼†	17½*†	25/-	+6d		—	
Switchgear&Cowans (5/-)	22½	22½	16/-	—	7	0	8
Taylor T. (5/-) ..	20	25	20/6	+⅛	6	2	0
T.C.C. (10/-) ..	20	20*	38/-	—		—	
T.C. & M... ..	10	10	28/-	—		—	
TelephoneMfg.(5/-)	10	10	9/3	—	5	8	0
Thorn. Elec. (5/-)..	10	12½	9/6	—	6	11	6
Tube Investments	25	15*	61/3	—	4	18	0
Vactric (5/-) ..	Nil	Nil	4/6	—		Nil	
Veritys (5/-) ..	Nil	7½	5/-	—	7	10	0
Walsall Conduits (4/-)	70	70	46/6	—		—	
Ward & Goldstone (5/-)	45	45*	31/-	—		—	
Watford (2/-) ..	25	25	6/9	—	7	8	3
Westinghouse Brake	14	15	60/-	+½	5	0	0
West, Allen (5/-) ..	12½	15	11/6	+6d	6	10	6
Trusts, Transport and Communications							
Anglo-Am. Tel.: A Ord. ..	—	6	78/-	—	7	13	9
Ord.	—	3¾	52½	—	7	2	9
Anglo-Portuguese	8	8	21/6	—	7	8	10
Brit. Elec. Traction: Def. Ord. ..	22½	25	500	+15	5	0	0
Cable & Wireless: Ord.	6	8	125½	−1	6	7	6
4% Loan ..	4	4	94½	—	4	4	9
Calcutta Trams ..	6†	6†	22/3	—	5	7	9†
Cape Elec. Trams	5	5½	11/-	+1/-	10	0	6
Marconi Marine ..	10	10	31/-	−6d	6	9	0
Oriental Tel. Ord.	16	16	60/-	—		—	
Telephone Props...	8	8	33/9	—	4	14	10
Tele. Rentals (5/-)	10	10	9/3	—	5	8	1

* After capital bonus.
† Dividends are paid free of Income Tax.

NEXT WEEK'S EVENTS

Monday, 2nd March

BIRMINGHAM.—James Watt Institute, Gt. Charles Street, 6 p.m. I.E.E. South Midland Centre. "Review of Electricity Applied to Mining," by B. L. Metcalf. (Joint meeting with the Supply and Utilization Group.)

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Supply Group. "Electricity Supply—A Statistical Approach to some particular Problems," by R. B. Rowson.

IPSWICH.—Crown & Anchor Hotel, 6.30 p.m. I.E.E. district meeting. "Electrical Equipment of Battery Road Vehicles," by W. D. Sheers.

LEEDS.—Great Northern Hotel, 7.30 p.m. A.S.E.E. Leeds Branch. "From Nebula to Man," by W. L. Whittle.

LIVERPOOL.—Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey and North Wales Centre. Discussion on "Economics in Wiring Practice," opened by Forbes Jackson, P. McKearney and A. V. Milton.

LONDON.—Caxton Hall, S.W.1, 7 p.m. E.P.E.A. London Technical Group. "Superimposed Frequency Control Systems," by J. F. Mackenzie.

NEWCASTLE-UPON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "An Improved Scanning Electron Microscope for Opaque Specimens," by D. McMullan.

Tuesday, 3rd March

CAMBRIDGE.—University Arms Hotel, 7 p.m. I.E.E. Cambridge Radio Group. "A New Approach to Housing Estate Low-Voltage Distribution," by H. T. Ransley.

COVENTRY.—Technical College, 7.30 p.m. Institution of Engineering Inspection, Coventry Branch. "The Atom in Engineering," by Dr. H. C. Smith.

ELTHAM.—Congregational Church Hall, Court Road, 8 p.m. A.S.E.E. South-East London Branch. "Television Production."

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South-West Scotland Sub-Centre. "The Place of Steam, Water and Wind Power in an Integrated Scheme for the Generation of Electricity," by C. W. Marshall, A. Feiner and J. Venters.

HAMMERSMITH.—Windsor Castle Hotel, 134, King Street, 7.30 p.m. A.S.E.E. West London Branch. "Floodlighting of Sports Arenas," by A. C. Holden.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements and Radio Sections joint meeting. "The Study of a Magnetic Inverter for Amplification of Low-Input-Power d.c. Signals," by Dr. E. H. Frost-Smith, and "The Parallel-T d.c. Amplifier: A Low-Drift-Amplifier with Wide Frequency Response," by P. S. T. Buckerfield.

MAIDSTONE.—"Wig & Gown," 7.30 p.m. I.E.E. district meeting. Informal evening.

MANCHESTER.—Engineers' Club, Albert Square, 7 p.m. I.E.E. North-Western Centre. "Industry and the Common Law," by Prof. W. Mansfield Cooper. (Eighth annual lecture in co-operation with Manchester University).

Engineers' Club, Albert Square, 6.45 p.m. Purchasing Officers' Association, Manchester Branch. "Oil Refining and its Uses."

STOKE-ON-TRENT.—31, Kingsway, 6 p.m. I.E.S. Stoke-on-Trent Group. "Lighting of Television Studios."

Tuesday, 3rd March—Saturday, 28th March

LONDON.—Olympia. *Daily Mail* Ideal Home Exhibition.

Wednesday, 4th March

BIRMINGHAM.—Chamber of Commerce, New Street, 7.30 p.m. Institution of Engineering Inspection, Birmingham Branch. "The Heat Treatment of High Temperature Materials," by T. E. Cound.

EDINBURGH.—I.E.S. Edinburgh Centre. Annual dinner and social.

LONDON.—I.E.E. London Students' Section. 2 p.m. Visit to Ford Motor Co., Ltd., Dagenham.

Waterloo Bridge House, 5 p.m. The Institution of Post Office Electrical Engineers, London Centre. Informal meeting. "The Problem of Supervision in the Post Office," by F. B. Wilcher and J. Meade.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Institution of Heating & Ventilating Engineers. Annual meeting and Presidential Address.

MIDDLESBROUGH.—Cleveland Scientific Technical Institute, Corporation Road, 6.30 p.m. I.E.E. Tees-Side Sub-Centre. "Brains Trust."

NEWCASTLE-UPON-TYNE.—Roadway House, 8, Oxford Street, 6.15 p.m. I.E.S. Newcastle Centre. "Luminescence as Applied to Lighting," by H. G. Jenkins and A. H. McKeag.

RUGBY.—College of Technology and Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "The Royal Festival Hall: Electrical Installation," by J. G. Hunter.

SHEFFIELD.—City Hall, 6.30 p.m. I.E.E. Sheffield Sub-Centre. Faraday Lecture. "Light from the Dark Ages, or the Evolution of Electricity Supply," by A. R. Cooper.

SOUTHAMPTON.—The University, 6.30 p.m. I.E.E. Southern Centre. "Electronic Telephone Exchanges," by T. H. Flowers.

Thursday, 5th March

CROYDON.—Café Royal, North End, 8 p.m. A.S.E.E. South London Branch. "Electrical Installations," by W. F. Parker.

EXETER.—Providence Hall, Northernhay Street, 7 p.m. I.E.S. Exeter Group. "Outdoor Illumination," by H. A. Turner.

GLASGOW.—Glasgow University, 7 p.m. British Institution of Radio Engineers, Scottish Section. "Electronics in Nuclear Research," by J. M. Reid.

I.E.S. Glasgow Centre. Annual dinner and social.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "Design Features of Certain British Power Stations," by S. D. Whetman and A. E. Powell. (Joint meeting with the I.Mech.E.)

NOTTINGHAM.—Demonstration Theatre, E.M.E.B., Smithy Row, 6 p.m. I.E.S. Nottingham Centre. "The Lighting of Power Stations," by L. H. Hubble.

PETERBOROUGH.—Eastern Gas Board's Demonstration Theatre, Church Street, 7.30 p.m. Incorporated Plant Engineers, Peterborough Branch. "Modern Refrigeration."

TYTHING.—Talbot Hotel, 7.15 p.m. Worcester Electric Club. "Motors in Engineering," by J. D. Bailey.

Friday, 6th March

BIRMINGHAM.—Grand Hotel, 6.30 for 7 p.m. Birmingham Electric Club. Annual dinner.

BRISTOL.—S.W.E.B. Lecture Theatre, Colston Avenue, 6.15 p.m. I.E.S. Bath and Bristol Centre. "Outdoor Illumination," by H. A. Turner.

DONCASTER.—Danum Hotel, 7.30 p.m. Institution of Works Managers, Doncaster Group. "Planned Maintenance," by J. Heaton.

EDINBURGH.—George Hotel, 7 for 7.30 p.m. I.E.E. Scottish Centre. Annual dinner.

LIVERPOOL.—9, The Temple, Dale Street, 7.30 p.m. A.S.E.E. Liverpool Branch. "The Effect of Electric Shock on Humans," by D. A. Picken.

LONDON.—Savoy Place, 7 p.m. I.E.E. London Students Section. "Industrial Health Hazards," by B. J. Sherwood. (Joint meeting with the Association of London Students of the Institution of Civil Engineers, and the London Graduates' Section of the Institution of Mechanical Engineers.)

"The Prince of Wales," Great Queen Street, W.C.2, 12.30 for 1 p.m. Engineer-Buyers' and Representatives' Association. Informal luncheon.

NOTTINGHAM.—Victoria Station Hotel, 6.45 for 7.15 p.m. I.E.E. East Midland Centre. Annual dinner.

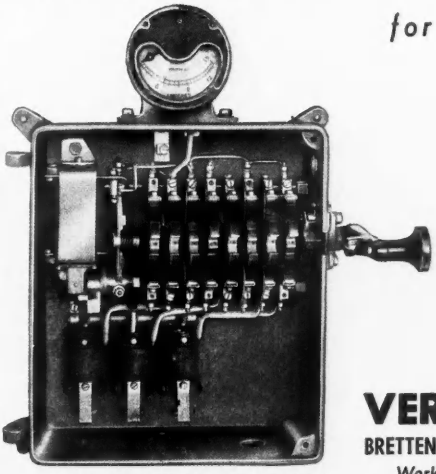
STOKE-ON-TRENT.—Electricity Showroom, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "A Logical Approach to the Problems of Electric Space-Warming," by D. H. Perry.

WORTHING.—Assembly Hall. Electrical Industries Benevolent Association, Sussex Centre. Annual ball.

CONTROL

for

A.C. MOTORS



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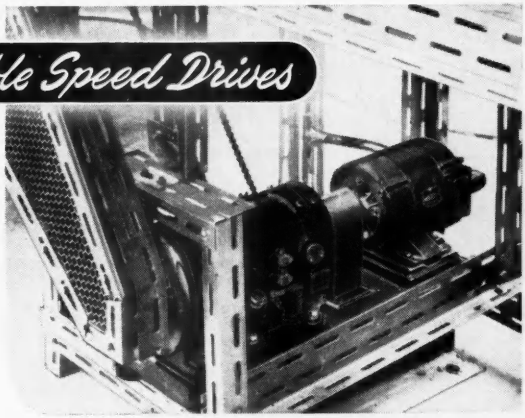

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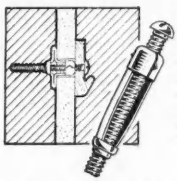

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NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 8th April, from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1948

9365. General Electric Co., Ltd., Edwards, E. F., Francis, V. J., Isaacs, G. G., and Samuels, D. E. J.—High-pressure electric discharge lamps. 30th March, 1949. Cognate applications 19968, 26th July, 1948, 19969, 26th July, 1948, and 1774, 21st January, 1949. (689962.)

1949

1517. British Thomson-Houston Co., Ltd.—Wave-guide structures. 19th January, 1949. (690027.)

2927. Keig-Shevlin, J. T. (Lignes Telegraphiques et Telephoniques).—Devices for making hermetic joints and seals in insulated electric cables. 2nd February, 1949. Convention date not granted. (689965.)

8378. General Electric Co., Ltd., and Sowter, A. B.—Cold-pressure welding. 20th March, 1950. (689893.)

8683. Sylvania Electric Products, Inc.—Secondary-electron emitters and method of manufacture. 30th March, 1949. (689966.)

10038. British Thomson-Houston Co., Ltd. (General Electric Co.).—Fluorescent lamps. 13th April, 1949. (689967.)

19532. Rheolaveur General Construction, Ltd., Parolle Electrical Plant Co., Ltd., Halmshaw, H., Fawcett, R. H., and Archbold, E. F.—Electrical control mechanism. 25th October, 1950. (690034.)

25830. H.M. Postmaster General.—Manufacture of tapped inductors, transformers and the like. 11th September, 1951. (689970.)

26138. Marconi's Wireless Telegraph Co., Ltd.—Radio beacons. 31st July, 1950. (689781.)

26938. Chappell, H. H.—Electric incinerators. 19th January, 1951. (689971.)

27332. Honorary Advisory Council for Scientific and Industrial Research.—Electrical heating of rotary compressors. 13th October, 1950. (689901.)

28089. Metropolitan-Vickers Electrical Co., Ltd.—Electrical winding and like gear. 19th September, 1950. (690035.)

33362. English Electric Co., Ltd.—Multi-break electric circuit breakers. 8th December, 1950. (689973.)

1950

3938. Electric & Musical Industries, Ltd.—Apparatus for generating colour television signals, or for receiving such signals. 16th February, 1951. (689785.)

5108. Armstrong Siddeley Motors, Ltd.—Electrical control of change-speed gearing. 14th February, 1951. (690045.)

12865. Ultra Electric, Ltd., and Sturgeon, H. G.—Method of and means for examining surfaces for the purpose of detecting any defects therein. 23rd April, 1951. (689792.)

13272. English Electric Co., Ltd.—Electric-discharge devices. 24th May, 1951. (689979.)

13454. Southern, F. J.—Electric time switches. 18th May, 1951. (689913.)

13769. Marconi's Wireless Telegraph Co., Ltd.—Attenuating transmission lines. 12th February, 1951. (689845.)

13858. Reyrolle & Co., Ltd., A., and Chrisp, G. F.—Electromagnetic relays. 24th May, 1951. (690048.)

14614. T.M.M. (Research), Ltd., and Robinson, F. C.—Means for preventing or dissipating electrostatic charges in textile machinery. 29th May, 1951. (689849.)

15357. Johnson, Matthey, & Co., Ltd., and Painton & Co., Ltd.—Electrical resistors and a method of making them. 20th June, 1951. (689795.)

15444. Soc. Civilie d'Etudes de Calcul Automatique, S.C.E.C.A.—Electronic calculating machines. 20th June, 1950. (690050.)

16452. Cossor, Ltd., A. C., and Spencer, T. H. N.—Electro-cardiograph apparatus. 28th September, 1951. (690052.)

18361. General Radiological, Ltd., and Quittner, V.—Circuits for controlling X-ray tubes. 18th July, 1951. (689798.)

18362. General Radiological, Ltd., and Quittner, V.—Operation of X-ray tubes. 18th July, 1951. (689799.)

26196. Giles, E.—Method of winding electric motors for a.c. 5th October, 1951. (689804.)

26571. General Electric Co., Ltd., and Sowter, A. B.—Cold-pressure welding. 11th June, 1951. (689927.)

27562. Christiansen, C., and Rusch, G. O. K.—Harpoon line for electrocution of whales and the like. 10th November, 1950. (689919.)

28532. Bosch Ges., R.—Electrical appliances for producing oscillations or vibrations in liquids. 22nd November, 1950. (689990.)

28551. Foster Wheeler, Ltd.—Liquid-cooling towers and the like. 22nd November, 1950. (689805.)

28698. Electric Construction Co., Ltd.—Voltage control of alternators. 31st October, 1951. (689920.)

28810. Metropolitan-Vickers Electrical Co., Ltd.—Arc welding. 24th November, 1950. (689921.)

29250. British Thomson-Houston Co., Ltd.—Magnetic cores for electrical induction apparatus. 29th November, 1950. (689992.)

29364. British Thomson-Houston Co., Ltd., and Ludbrook, L. C.—Load current control circuit, including an electric discharge device. 30th November, 1950. (689993.)

29701. General Electric Co., Ltd., Gledhill, H. B., and Sykes, N. A.—Electrical plug and socket connectors. 15th October, 1951. (689922.)

31116. Morris Motors, Ltd.—Stop-lamp switches for motor vehicles. 23rd January, 1952. (689994.)

31668. Santon, Ltd.—Flexible plugs for radiators for space heating. 31st December, 1951. (689809.)

1951

46 & 118. Davis, Wynn, & Andrews, Ltd.—Charging systems for electroscopes. 1st and 2nd January, 1952. (689810/1.)

519. British Thomson-Houston Co., Ltd.—Means for deriving a direct from an alternating voltage. 18th December, 1951. (689996.)

524. Philips Electrical Industries, Ltd.—Electron-discharge devices. 8th January, 1951. (689929.)

1437. Napier & Son, Ltd., D.—Electrical condensers. 16th January, 1952. (689998.)

1533. British Insulated Callender's Cables, Ltd.—Electric testing and measuring arrangement of the bridge type. 18th January, 1952. (690067.)

1739. General Electric Co., Ltd., and Harling, D. W.—Electric circuits. 15th January, 1952. (689999.)

2152. Tesla, National Corporation, and Kuhn, A.—Indicator of soft gamma and other rays given off by radio-active materials which are capable of exciting luminescent materials to emit photons in the ultra-violet range. 29th January, 1951. (689933.)

3039. Bendix Aviation Corporation.—Shock-excited oscillatory circuit. 7th February, 1951. (689813.)

4115. British Thomson-Houston Co., Ltd.—Cooling of static electrical condensers. 20th February, 1951. (689865.)

4448. Telefonaktiebolaget L. M. Ericsson.—Electromagnets. 23rd February, 1951. (689938.)

4771. Radio Corporation of America.—Thyratron electron discharge arrangement. 27th February, 1951. (689939.)

4958. Elektrokemisk Aktieselskap.—Operation of electric furnaces having continuous self-baking electrodes. 1st March, 1951. (689816.)

6050/1. Cinch Manufacturing Corporation.—Electrical socket connectors. 13th March, 1951. (689866/7.)

8674. Hazeltine Corporation.—Colour-television system. 13th April, 1951. (689821.)

11811. Stratta, R.—Electro-melting process for the extraction of precious metals from ashes or industrial residues. 21st May, 1951. (689824.)

13902. Philips Electrical Industries, Ltd.—Manufacture of flat grids for high-frequency electric discharge tubes. 12th June, 1951. (689947.)

14126. Zeiss Ikon Akt.-Ges.—Electric exposure meters. 14th June, 1951. (690079.)

16932. Standard Telephones & Cables, Ltd.—Electric oscillation generators. 17th July, 1951. (690013.)

17264. Standard Telephones & Cables, Ltd.—Receiving arrangement for multi-channel carrier frequency systems. 20th July, 1951. (690080.)

18771. Westinghouse Electric International Co.—Therapy X-ray tube supply system. 9th August, 1951. (689953.)

19696. British Thomson-Houston Co., Ltd.—Thermal-responsive devices for electrical apparatus. 21st August, 1951. (689882.)

19790. British Thomson-Houston Co., Ltd.—Surface finish of insulated conductors and electric cables. 22nd August, 1951. (689954.)

19888. Allis-Chalmers Manufacturing Co.—Arc chutes in electric circuit interrupters. 23rd August, 1951. (689955.)

22272. Beckman Instruments, Inc.—Glass electrodes for pH measurement. 24th September, 1951. (690085.)

23162. Dow Chemical Co.—Electrolytic production of magnesium and chlorine. 4th October, 1951. (690018.)

25729. Siemens & Halske Akt.-Ges.—Circuit arrangement for frequency adjustment in reception installations for frequency-keyed telegraphy transmitters. 2nd November, 1951. Addition to 685798. (689886.)

26437. Radio Corporation of America.—Sealed-off microwave gas cells. 12th November, 1951. (689959.)

1952

1141. Mullard Radio Valve Co., Ltd.—Electrical wavemeters. 15th January, 1952. (690020.)

1375. British Thomson-Houston Co., Ltd.—Wound-electric insulation. 17th January, 1952. (690022.)

1524. Philips Electrical Industries, Ltd.—Pulse transponders for radar systems. 18th January, 1952. (690024.)

1858. Electric Storage Battery Co.—Filling and venting devices for electric accumulators. 23rd January, 1952. (690088.)

8963. Metropolitan-Vickers Electrical Co., Ltd.—Control systems for electric motors. 19th September, 1950. Divided out of 690035. (690090.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 18th March.

RAPISONIC. No. 714,016, Class 7. Emulsifying, homogenizing and mixing machines, and parts thereof included in Class 7.—Ultrasonics Ltd., Central Chambers, Cheapside, Bradford.

STERLENE. No. 712,686. STERLINE. No. 712,687. Class 9. Insulated electric wires and cables.—Sterling Cable Co., Ltd., Sterling Works, Aldermaston, Berks.

SARAH. No. 713,321. Class 9. Radio location instruments and apparatus; wireless telegraphic, telephonic and television transmitting, receiving and amplifying apparatus; electric and electronic control apparatus included in Class 9; radar apparatus; electrically-operated testing and calibrating apparatus; speed-indicating, recording and governing apparatus included in Class 9, and condensers, resistances, magnets, gramophone pick-ups, sound amplifiers and cut-outs, all being electrical apparatus; and parts included in Class 9 of all the aforementioned goods.—Ultra Electric, Ltd., Ultra Works, Western Avenue, Acton, London, W.3.

Australian Manufacture

THERE was an increase of about 30 per cent in the value of Australia's manufacture of electrical goods between 1949–50 and 1950–51. The total was £A63 million and in addition radio and amplifying apparatus was produced to the value of £A16·6 million. The principal lines of machinery and apparatus are shown in the accompanying table, with notes of increases or decreases (negligible) on the previous twelve-monthly period. It will be seen that the range of production widened. For 1950–51 figures for motors are not available; in 1949–50 the value stood at £A2,350,000.

Factories making electrical machinery numbered 867 compared with 811, with employees totalling 35,494 (30,956). The year's wages aggregated £A18·8 million (£A13·6 million). There were also 139 factories engaged in producing radio and amplifying apparatus, the year's wages paid to 10,698 employees totalling £A5·2 million.

Class of Goods	1950-51 £A (000)	Inc. or dec. on 1949-50 £A (000)
Alternators	117	+ 12
Generators	893	+ 375
Transformers and convertors above 20 kVA	948	+ 322
Ditto below 20 kVA		
For use in neon lamps	98	+ 34
" " " radio and toys	219	+ 54
" " " supplying power and light	507	+ 202
Storage batteries & accumulators		
For automobile and radio	2,792	+ 799
" power plant	408	+ 54
Other	383	+ 130
Apparatus for telegraphy and telephony	4,915	+ 1,716
Electric meters	1,457	+ 282
Apparatus for regulating, starting and controlling	4,818	+ 1,169
Household fittings(switches, etc.)	3,001	+ 1,365
Portable tools and appliances	360	— 302
Fans	503	+ 186
Irons	370	+ 215
Radiators and fires	266	+ 61
Toasters	223	— 21
Washing machines	3,562	+ 2,223
Vacuum cleaners (domestic)	838	— 21
Floor polishers	729	*
Hot water jugs	196	*
Domestic stoves	1,847	*
Cookers, etc.	723	*
Refrigerators, household		
Absorption type	764	+ 179
Compression type	10,191	+ 3,963
Refrigerators, commercial	1,871	+ 698
Radio apparatus (exclu. valves)	12,889	*

* Comparative figures not available.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Bath.—7th March. City Council. Street lighting equipment. (See this issue.)

Belfast.—5th March. Ministry of Finance. Electrical installation at Plant Pathology Laboratories, Newforge Lane. The Ministry (Room 103), Law Courts Building, May Street.

10th April. Corporation. Drainage pumping equipment at Victoria power station. (See this issue.)

Ealing.—9th March. Corporation. Electrical installations in schools. (See this issue.)

King's Lynn.—14th March. Borough Council. Electric lamps for one year. H. G. Ridler, borough surveyor, 17, Queen Street.

Llanelly.—7th March. Stage lighting equipment, emergency lighting equipment, cable, wire, switches, distribution boards, etc., at the Pontyberem Memorial Hall and Institute. G. Bowen, secretary, Memorial Hall.

Londonderry.—17th March. Northern Ireland Housing Trust. Electrical installations in 24 flats at Creggan. The Trust, 12, Hope Street, Belfast.

Mansfield. — 17th March. Corporation. Street lighting equipment. (See this issue.)

Merthyr Tydfil. — 7th March. Borough Council. Electrical goods for one year. Surveyor, Town Hall.

New Zealand.—WELLINGTON. 8th April. Director General (Stores Division), G.P.O. Switchboard cords. (C.R.E. 6371/53. Ten/5787.)*

Pakistan.—KARACHI.—10th March. Department of Supply and Development. Power transformers and switchgear. (C.R.E. 7116/53. Ten/5803.)* 17th March. Supply of eight 13.6 kW diesel-driven lighting sets. (C.R.E. 6217/53. Ten/5775.)*

Staffordshire. — 21st March. Educational Committee. Electrical repairs and installations in schools in the South East Division. Divisional education officer, Walsall Street, Wednesbury.

Stourbridge.—6th March. Borough Council. Flood and festoon lighting equipment. Parks superintendent, Stevens Park, Wollescote.

Uruguay. — MONTEVIDEO. — 27th March. Usinas Electricas y los Telefonos del Estado. Supply of 6.3 kV transformers and spare equipment. (C.R.E. 6744/53. Ten/5795.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

ORDERS PLACED

Durham. — County Education Committee. Electrical installation at the Binchester County School (£335).—R. Robson (Willington).

Grimsby.—Corporation. Electrical installation, workshop block, College of Further Education (£3,047).—H. Carr, Ltd.

Littlehampton. — Housing and Buildings Committee. Electrical installation work in "L" type houses on the Wickbourne estate (£761).—W. Laker.

Newcastle-on-Tyne. — Regional Hospital Board. Electrical work at Walkergate Hospital (£896).—Falconar Cross & Co., Ltd.

Swansea. — Housing Committee. Electrical installations in 116 houses (£2,972).—Clarke Bros. (Stroud), Ltd.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Blood transfusion centre; Pite, Son & Fairweather, architects, 6, Queen Anne's Gate, S.W.1.

Alnwick.—Alterations to business premises in Market Street (£10,000); Reavell Brothers, Ltd., ironmongers.

Fire station and 11 houses; C. C. Brown, county architect, County Hall, Newcastle-on-Tyne.

Amersham.—Houses (64), St. Giles, for R.D.C.; Comben & Wakeling, Ltd., builders, Kenton Lane, Kenton.

Anglesey. — Voluntary school, Holyhead; L. C. Wakeman & Partners, quantity surveyors, Grove Chambers, Bangor Street, Caernarvon.

Barnsley.—Houses (138), Athersley estate; W. Dunk & Sons, Ltd., 72a, Eldon Street.

Barrow-in-Furness. — Houses (119), Tummerhill estate; J. N. Flitcroft, borough surveyor, Town Hall.

Barton-on-Humber. — Houses (16), Tofts Road estate; H. D. Foster, Barton-on-Humber, Lincs.

Bexhill.—Houses, etc. (220), Deans Drive and Southlands Road; A. E. Geldard, borough surveyor, Town Hall.

Birmingham. — Rebuilding works for Southalls (Birmingham), Ltd.; Martin & Martin, architects, 106, Colmore Road.

Blackpool.—Erection of St. Paul's County Infants' School; Wm. Eaves & Co., Ltd., Brick Works, Marton, South Shore.

Block of three-storey flats at junction of Talbot Road, Elizabeth Street and Whiteside Street; Gregson & Son, 3, Newhouse Road, Marton.

Boston.—Houses (36) and flats (24), Freiston Road; Mr. H. H. Adkins, Wide Bargate, Boston, Lincs.

Brighton.—Flats (18) and maisonnettes (12) in five three-storey blocks, and 32 houses at Craven Vale; town clerk.

Six shops, with 15 flats above, and five garages at corner site St. George's Road and College Place; town clerk.

Bromley (Kent).—Flats (31), Park site; H. Payne Wyatt, Son & Partner, architects, 465, Brixton Road, S.W.9.

Burnley.—Crematorium; Taylor & Young, consulting architects, 195, Oxford Road, Manchester, 13.

Cardiff.—Flats (18), Cathays Terrace; R. B. Fear, Ltd., builders, 1, Museum Place.

Carlisle.—Extensions; W. Carrick & Sons, Ltd., South Vale Works.

Chatham. — Houses (150), Weeds Wood estate; borough engineer.

Chelmsford.—Granary, stores, garage and offices, Arbour Lane; Cramphorns, Ltd., High Street.

Dwellings (24), South Street; Wade Made Houses, Ltd., Seventh Avenue.

Cheltenham. — Factory; Ford & Weston, Ltd., Osmaston Road, Derby.

Chesterfield. — Houses (180), Hady Lane estate for Coal Industry Housing Association; W. J. Simms, Son & Cooke, Ltd., Nottingham.

Consett.—Houses (44), Ebchester, and shops on the Richard Murray Hospital site, Blackhill; J. J. Eltringham, architect, Derwent Street, Blackhill.

Craigneuk (Lanarkshire). — Power house for mills (£32,000); Lanarkshire Steel Co., Ltd.

Crawley.—Factory; Silentbloc, Ltd., Victoria Gardens, W.11.

Darlington.—Shops along the west front of the covered market; borough architect, Central Buildings.

Dartford. — Operating theatre and other additions at West Hill Hospital (£36,500); South East Metropolitan Regional Hospital Board, 27, Queen Anne Street, London, W.1.

Edinburgh.—Adaptations at Palace Cinema and restaurant, Princes Street (£76,000); F. W. Woolworth & Co., Ltd., 1, New Bond Street, London, W.1.

Folkestone.—Flats (36), North Street; borough surveyor, Municipal Offices, West Terrace.

Gainsborough (Lincs). — Proposed new Town Hall; U.D.C. architect.

Halesowen.—Houses (30), Howley Grange estate; J. C. T. Cole, architect, Central Buildings, Long Lane, Blackheath, near Birmingham.

Hornchurch.—Flats (78), on Front Lane, Cranham; P. L. Cox, clerk to U.D.C.

Jarrow-on-Tyne. — Terrace houses (41), Ormonde Street; H. W. T. Perkins, borough engineer.

Leicester. — X-ray and casualty block at Leicester Royal Infirmary (£179,949); H. Herbert & Son, 33, Millstone Lane, Leicester.

Leith.—Extensions to premises (£18,500); British Ropes, Ltd., 15, Bath Street.

London.—CITY.—Ward block at St. Bartholomew's Hospital; Adams, Holden & Pearson, architects, 2, Gordon Square, W.C.1.

POPLAR.—Flats (29) and houses (5), Bazeley Street; borough engineer.

Macclesfield.—Houses (80), Poynton and Sutton; H. Chadwick, R.D.C. surveyor, King Edward Street.

Newcastle-on-Tyne. — Sports stadium at Ouseburn (£12,000); city engineer, Town Hall.

Pontypool.—Dwellings (53), Trevethin; C. Dawkes, architect, Market Buildings.

Poole.—Primary school, Hillbourne; borough engineer.

Portsmouth.—Works extensions; J. Dring, Ltd., The Airport.

Houses (112), Leigh Park; Faulkners, Ltd., 113a, London Road, Waterlooville.

Rawtenstall.—Houses (32), Staghills estate, for U.D.C.; Ashworth & Hobson, Lee Brook, Burnley Road.

Rochdale.—Houses (306), Kirkholt estate; borough surveyor, Town Hall.

St. Albans.—Development of 40-acre estate at London Road for housing, etc.; A. S. Moody, city surveyor, 16, St. Peter's Street.

St. Andrews. — Reconstruction of Madras College (£110,000); R. S. Laurie, county architect, County Chambers, St. Catherine Street, Cupar, Fife.

Salford. — Police headquarters; Bradshaw, Gass & Hope, architects, 19, Silverwell Street, Bolton.

Flats (12), Park Place; C. Musker Bros., Ltd., Swinton.

Scarborough.—Maisonnettes and flats (76), Manham Hill, Eastfield; borough engineer.

Smethwick. — Works extension, Grove Street; John Wilkes, Sons & Mapplebeck, Abberley Street.

Houses (202); Eadie & Co. (Wolverhampton), Ltd., 29, Waterloo Road, Wolverhampton.

Sunderland. — Houses (1,750), Castletown; H. C. Bishop, borough architect, Grange House, Stockton Road.

Five shops and flats at Farringdon (£26,000); W. Wigham & Son, builders, Castletown, Sunderland.

Tunbridge Wells.—Houses (108), Coneyburrow Road and Sherwood Road; H. P. Bishop, borough surveyor, Town Hall.

Walsall.—Extensions to public works depot (£15,520); W. Wilkinson, Ltd., Hutton Road, Handsworth, Birmingham.

Walthamstow. — Additions to premises (£33,000); Duroglass, Ltd., Blackhorse Lane.

Wokingham. — Houses (49), Finch Road, Earley; Eric G. V. Hives, architect to R.D.C., 3, Cork Street, Reading.

York.—Houses (200), Chapel Fields estate; C. J. Minter, city engineer, Guildhall.